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GETTING READY FOR VACATION

If you have not done so already, read the editorial entitled "Persevering to the End" which appeared on page 157 of the last issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION. You will find a check list of duties in that editorial which will prove helpful.

YOUR FUTURE ADDRESS

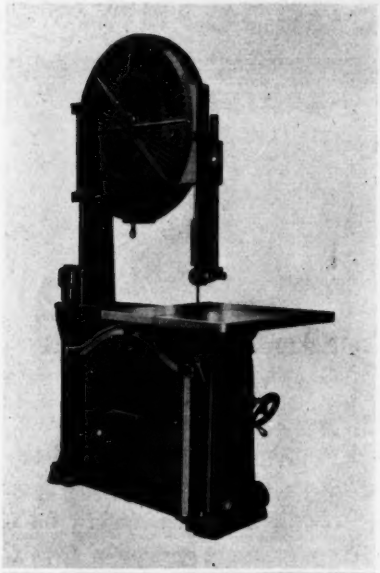
Are you going to change your address, either for the summer months, or for the coming year? If you are, notify our circulation department, to make sure that you will not miss any issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION.

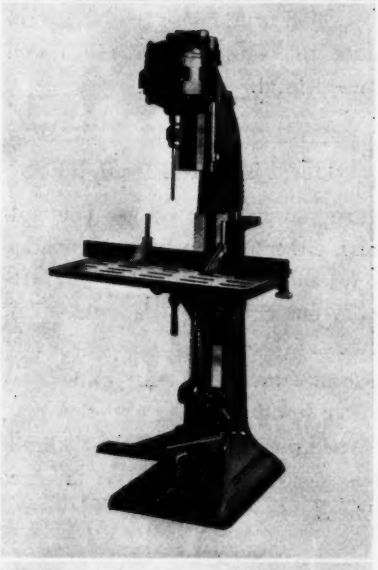
When requesting the change, kindly give your present as well as the new address.

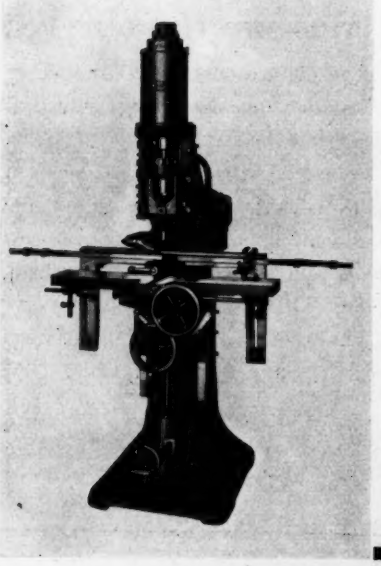
THIS MONTH'S COVER

The picture on this month's cover is another one depicting industrial practice. The arc welder is shown welding the lattice bars on one of a pair of gantry cranes used on the National Terminals Company's new dock and warehouse at Cleveland, Ohio.

Photo courtesy of The Lincoln Electric Company, Cleveland, Ohio.







Only good tools will produce good work

ONLY with good tools—tools of the most modern design and construction—can the pupils of vocational and manual training schools learn to do good work. No amount of theorizing can counteract the retarding influence and the discouraging effect on the pupil resulting from poor craftsmanship, which frequently is directly attributable to poor tools.

The three Yates-American machines shown here are excellent examples of modern engineering. They typify the progress in woodworking machinery that has resulted from today's demand for speed, safety and reliability. They exemplify the modern tendency toward greater ease of operation and increased results per unit of effort. They are part of our fulfillment of the requirements of industry which we are pleased to contribute to the progress of vocational education.

Descriptive circulars of these machines will be gladly sent upon request

YATES-AMERICAN

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VOCATIONAL DIVISION
BELOIT, WISCONSIN, U. S. A.

INDUSTRIAL ARTS and VOCATIONAL EDUCATION

VOLUME 21 JUNE, 1932 NUMBER 6

Elements of Response to Federal Stimulus in Vocational Education

*J. V. Lynn**

IN a comparison of data from the annual report to Congress of the Federal Board for Vocational Education, 1931, showing enrollments for industrial education, one is amazed at the evidences of growth which has taken place in the fourteen years of effort under the influence of the National Vocational Education Act, more familiarly known as the Smith-Hughes Act, of 1917. There has been no particular surface disturbance on the educational waters, but apparently there has set in a rather defined and directional "gulf stream" toward the objective of a more socially responsive educational structure.

In the accompanying table the total expansion over the initial school year of 1917–18 is displayed, and the multiples for the various types of effort are shown.

TABLE I

Statistical Summary of Student, Teacher, and Teacher-Training Expansion in Trade and Industrial Education in the United States Under the Smith-Hughes Act

	Students Enrolled		
Year	*Evening*	*Part-time*	*All Day*
1931	168,822	342,513	80,541
1918	46,333	53,005	18,596
Increase	3.64 times	6.46 times	4.33 times
	Teachers Employed		
Year	*Evening*	*Part-time*	*All Day*
1931	5,449	4,343	2,957
1918	1,397	827	1,052
Increase	3.9 times	5.25 times	3.3 times
	Teacher-Training Activity		
Year	*Agencies*	*Staff*	*Student Teachers*
1931	91	385	13,242
1919	68	219	2,674
Increase	1.34 times	1.16 times	4.95 times

Part-Time Schools

The most significant fact in student enrollment is the extraordinary 6-fold expansion in part-time education. That such should be the case is, without doubt, due to the emphasis placed upon that type of school in the Act itself. Section 11 reads in part, "that at least one third of the sum appropriated to any state for the salaries of teachers of trade, home-economics, and industrial subjects . . . shall, if expended, be applied to part-time schools or classes for workers over 14 years of age who have entered upon employment."

The employed minor has a peculiar interest for socially-minded people in the fact that he is prematurely subjected to a rigorous environment which, under the circumstances, must have more influence upon his success or failure than at any other period of equal length in his career. From actual personal experience with the development of part-time schools in one state, and as connected with the training of teachers for them since their inception, the writer has come to regard them as of prime value. Indeed, it would not be too dogmatic to posit the creed that vocational education in its industrial sense is more correctly a postemployment program than a preëmployment training system.

Granted that we have efficient full-time school activity there is even then none too much opportunity for the acquirement of basic, general education before the fourteenth year. The positive reasons are more convincing, however, because they are substantive. First, to provide preëmployment training in a full-time program involves equipment and teachers for a host of occupations (if justice be given to all), which is far beyond the public will and purse to provide. There is some demurrer at the present cost of general education as it is. Second, vocational guidance has no finality. It is not accomplished in a full-time school experience up to 14 years of age. There is much to be said in support of the guidance value of a range of juvenile employments. It would by no means be marking time. Third, standard equipment is available in industrial establishments, and employers are willing to invest power, maintenance, and time in its use for training apprentices and junior employees in the manipulative experiences which can be acquired nowhere else with as high efficiency and satisfaction to the learner. Conversely,

*Trade and Industrial Teacher Trainer, Iowa State College, Ames, Iowa.

excellent equipment for teaching applied art and drawing, technical mathematics, and the physical and chemical sciences is lying idle in our schools at a time when employed persons are free to use it. The school plant should be in use by some social group during as large a portion of the day and evening hours as may be needed. Fourth, vocationally competent teachers, after some professional adjustment, are available in industry to give the required manipulative training under exact conditions of environment and motive. In like manner, technical teachers, after some coördinated adjustment, are available in the schools to give related trade and industrial technology at hours when such teaching can have their undivided attention. And fifth, motivation from the learner's standpoint under all these conditions is particularly effective. Learning is not in advance of use, but everywhere runs parallel with it. Added maturity attaches to this effectiveness.

The writer remembers vividly his experience in 1919, when establishing a system of part-time schools in some twenty cities under a new state law. Some superintendents objected to the installation more because they feared it than because they did not believe in it. Administration of full-time schools was a known field, and evening schools were nominally established, but this new school brought back to them under law a former pupil under new conditions. What could be done for him? But in practically all cities there was a willingness to try something which might lessen the handicap of an aborted education.

There is a proprietory attitude and response on the part of employed youth toward a part-time school, wisely organized and staffed with skillful teachers, which would never obtain in any full-time organization used for that duty. Having escaped from school routine into "life," they will not return to it, but they come to "their" school, where they get "the real thing," meaning by that term a functioning ability for their own present life interests in vocation and society. Specially treated in a special school, they learn to value its coördinated function with adult life. The value given to part-time education in this point of view is that it is properly the bottom rung in a ladder of adult experiences rather than the top rung in a ladder of school experiences. Good continuation part-time subject matter and method should not be an importation from the full-time school, despite the incongruity in its descriptive name.

Two aspects of part-time education deserve some consideration at this point. The true part-time school is for the return of employed minors for from four to eight hours a week. The coöperative part-time school, while literally so, can be conceived as a full-time school in its philosophy, and is coming more into that position as it is being instituted. By coöperative agreement with industrial and business concerns, the school organizes designated groups of its student body into two equal sections which alternate between school and employment on an equal time basis, so as to furnish continuous service by individual pairs of students in employment, and also to furnish continuous attendance by sections at school. This is just a full-time total group projected half time into life's experiences for coördinated instruction. While they work half time and receive a nominal wage, they are not considered employees, but learners, because the work that they do is supervised by a school coördinator so as to provide an actual but richly varied experience in vocation as the basis of school instruction. Thus we are coming to consider a modern high-school commercial or industrial department as coöperative full time when its students are projected into a vocation as described, and to consider the commonly organized department as noncoöperative full time.

The employment of a coördinator in part-time education is unique. The function is ranked as equal to that of teacher on the score of federal reimbursement. If education is life, as seems to be a currently accepted position for it, then a coördination of home-school-vocation interests will meet the specification for our part-time school, and this is precisely what the coördinator does. He visits the employers and supervisors in industry, talks with the employed minor about his work and his sports, calls upon the parents regarding his prospects and interests. All of these contacts furnish source material for group instruction by the teacher after conference with the coördinator. Where the teacher is given time to do his own coördinating the combined functioning is ideal. The value of this service in treating the successive rungs of an adult experience-ladder is unquestionable.

Vocational Evening Schools for Adults

Continuation education for adults in the vocations will be evening-school type under all circumstances, and the federal act makes but two restrictions in the use of funds for that purpose. Instruction must be supplementary to the daily employment, and it must be of less than college grade. The former is opposed by some schoolmen because it does not permit admission of any person who can profit by instruction given in any specific line. This, however, is not what is meant. If it were, a lathe hand could not study to become a milling-machine hand, because he is not employed on a milling machine. The promotional element is basic, and if plumbers and steam fitters find that oxyacetylene welding is necessary to continue in their respective trades there is no bar to their enrolling along with such welders in order to acquire that skill. The person really excluded is the "hobby" man — the lawyer or teacher who wants to enroll in cabinetmaking to "make something for himself." Such an avocationist has no more place in the vocational procedure of the craft than a stranger would have in the ritual of a fraternal organization, not because the former is secretive but rather because it is technically beyond his ability to profit by and use. The federal law does not say the hobby cannot be satisfied in an evening class elsewhere, but it does infer that such introduction of varied purposes would be vocationally subversive. The principle

is particularly valuable in the shop courses for skill acquirement.

For trade mathematics, drawing, and science evening courses, the second restriction is pertinent. Instruction must be less than college grade. It must be directly related to the trade employment to any extent needed, whether of college rank or not. An evening class in the chemistry of beet sugar will surely advance beyond secondary-school chemistry and yet be within the law if beet-sugar men are taking it. What is meant again is that it cannot be offered as a two-credit college course in organic chemistry.

In these two restrictions there is no prohibition of opportunity to get instruction elsewhere. In the best interests of those for whom instruction is designed, it is essential that they be subjected to no interference during the limited private time which they have to give to self-improvement, and that that effort shall not be duplicated and dissipated, but made directly contributory to improvement of manual workers in industry through technical knowledge.

A most serious cause for mortality in attendance at evening schools has been the rigid, continuous type of courses offered. Utility is the criterion by which an evening-school offering is measured, and the symptom of utilitarian value is persistence of attendance. A forty-lesson evening course in carpentry with covering certificate cannot be so sensitive to individual needs as five independent short units, each covering a particular phase, with independent enrollment and certificate, even though it totals or exceeds the longer course.

Here is an excellent instance of response to social stimulus. It requires effort, both individual and social, to return to school on private time, hence the schools are under obligation to give the best possible service in return. Educational waste of time is serious enough in the compulsory full-time school, and unpardonable under those conditions where it cannot be closely checked. Voluntary attendance would very soon reveal waste, as it does so effectively in evening classes. Continued attendance through a series of units from year to year is an excellent barometer of value received. In Table I there appears better than a 3½-fold expansion.

Day Unit Trade Schools and Classes

The all-day vocational school or class is having an indifferent reception, notwithstanding the fact that Table I shows a 4-fold growth. In some states there has been a marked falling away from what was an auspicious beginning. In an early state program familiar to the writer, the all-day unit trade classes in the high schools were about the only kind to receive attention of local school authorities. Today the tide has receded to a very low ebb, but the part-time apprentice and evening schools are at flood.

The significance of the day trade recession is 2-fold; one in school reaction, and the other in industry. First, the school administrations made little or no attempt to determine the demand market for human product before launching upon this work. Placement was not considered any function of school procedure. The trade-school mills were put into production and the product dumped upon the market with no sales agency to distribute it. Boys who completed the first year and even the second full year of preparation had to leave town in order to find employment. The failure may be attributed to professional belief that vocational courses functioned like industrial arts, a unit in the complete scheme of education with no more vital connection to society than English composition. We do not place our English students in specific occupations, why any other? Furthermore, industry cannot in all localities absorb a plethora of boys trained in the few representative lines which constitute the usual category of shops used for industrial-arts purposes and now transformed by objective only into trade-training service. They are of the long-apprentice-period type, while industry uses special operators. The proportion of skilled mechanics is small in comparison with the number of machine hands required, and the long unit trade course of thirty-six weeks at thirty hours a week as a minimum cannot be used to develop mere "hands." The type is suitable only for supplying mechanics for a limited market.

Second, the effect of invention and automaticity in industry and by implication in industrial education. New tools and processes are appearing in ever-increasing volume and intricacy. Changes involving the transfer of skill and also of intelligence from man to machine need no amplification. Mutation and growth of ideas cannot be controlled howsoever much they may disturb social and economic institutions. Employers and labor are alike concerned over what is to be the outcome. The proportion of machinists who build the machines is very small in comparison with those who operate them. The former is the true machinist craftsman. The latter's interest lies wholly in advancing standardized parts for some company product one more stage toward completion. Schoolmen have the concept that machinists are machinists. In fact, the name is disappearing and we now have "toolmakers" and "machine hands" instead. The training for the former few goes on in most schools, but the latter and more numerous group of wage earners finds little that is directly profitable in the unit trade school. His problem is one of high skill and speed in a most restricted field of the trade. Few schools are equipped to give him such experience.

And what of the automatic machines? Those marvelous products of the toolmaker! So marvelous in replacing human hand and mind! The very intricacy and automaticity have changed the erstwhile tender into a technician of some quality. It demands technical training of no mean caliber to understand the mechanism, to set it up, to make it articulate and produce. We shall train skilled toolmakers to build, and skilled technicians to operate the ever-advancing automatic machines.

(To be Continued)

Organization of an Intermediate School Drafting Room

*Richard M. Carlsen**

IT is generally believed that there is very little organization needed in a school drafting room. While it is true that the work in the drafting room is not as complex as that in some other shops, nevertheless it is absolutely necessary to have drafting well organized in order to secure the best results from the pupils. The following plan has been used in the drafting room of one of Detroit's intermediate schools for the past two years, and has been found very satisfactory.

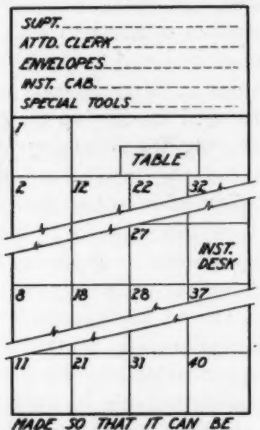


FIG. 1

Since the classes average about 40 pupils, there are 40 individual benches arranged in four rows. An extra table takes care of those classes in which the enrollment is larger than 40 pupils. Figure 1 shows the arrangement of the drafting room, while Figure 2 is a chart of the classroom organization.

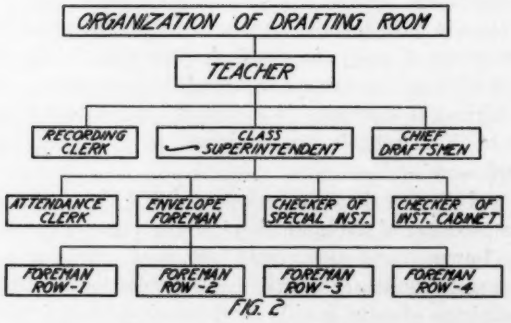


FIG. 2

The class superintendent is the first officer to be elected. The only requirement for eligibility for this office is regularity in attendance, and not scholastic achievement. If a troublesome boy is elected, he usually ceases to be a discipline case, as the honor of being superintendent acts as an incentive for doing better work.

The superintendent calls the class to order and then the attendance clerk, who is elected because he is reliable, takes the attendance. After he has the numbers of all the vacant seats, he says, "Roll is called," which is an indication for the superintendent to go ahead with his duties. The attendance clerk then refers to a seating chart to find out to whom the vacant seats belong, and marks them absent in the roll book and on the daily absent slip which then is sent to the homeroom teacher. By the time he has this done the class is working quietly, and then he goes to the boys who were absent from the previous class and asks for their excuses. If he thinks the excuse is satisfactory, he stamps the teacher's name on it. Boys whose excuses are unsatisfactory, or boys who have no excuse, are referred to the teacher.

Just as soon as the envelope foreman comes into the room, he gets the keys from the teacher, and opens the drawers containing the envelopes for that class. Each boy has such a manila envelope in which he keeps his drawings and supplies. The envelope foreman takes the envelopes for row one from the drawer and places them on the first desk in row one, and so on, for rows two, three, and four. There is a five-minute intermission between classes and the envelope foreman usually is through working when the superintendent calls the class to order. However, if he is not through with his work, he keeps right on while the roll is being taken. As soon as the envelopes are put on the front desk, the row foremen pass them out in their respective rows, and in most cases this is also done before the class is called to order. In case they only get half through passing out the envelopes when the class is called to order, they take their seats and finish passing them out after the attendance clerk has said, "The roll is called." The row foremen also are responsible for the neat and orderly appearance of their rows at all times.

A set of instruments is furnished for each desk. Such a set consists of a 6-in. compass with attachments, a 30–60-deg. triangle, a 45-deg. triangle, and a flat boxwood rule. This set is kept in a drawer shown in Figure 3, which fits into a place on the desk and also into the wall cabinet, shown in Figure 4. Each class gets these drawers from the instrument cabinet and puts them back before leaving. The checker of the instrument cabinet goes to the cabinet as soon as he gets in the room. While the attendance is being taken and the

*Instructor of Mechanical Drawing, Hutchins Intermediate School, Detroit, Michigan.

envelopes passed out, he checks the 40 drawers to see that the previous class left them in good condition. He remains at the cabinet until all in the class have secured their drawer after which he locks the cabinet and takes his seat. As soon as the envelopes have been passed out the superintendent says, "Row one, get your instruments; row 2," etc. Some days all in the class will want instruments and on other days there will be just a few because the rest of the class will be sketching. When all the boys, who need instruments, have secured them, the superintendent takes his seat after which the instructor takes over the class.

FIG. 3. INSTRUMENT DRAWER FIG. 4. WALL CABINET FIG. 5. INSTRUMENT CABINET

As soon as the checker of the special instrument cabinet comes into the room, he checks up his cabinet to see that the previous class left it in good order. He then puts a checking list up on the door and puts his name, grade, hour, and date on it (see Fig. 5). This cabinet contains 15 bow pencil compasses, 10 bow inking compasses, 5 bow dividers, 3 six-in. inking compasses, 1 six-in. divider, 20 ruling pens, 12 irregular curves, 2 erasing shields, 1 large pair shears, 1 screw driver, a pair of pliers, and a protractor. The checker sits right opposite the special instrument cabinet so that he can see that the student signs up when he takes out an instrument. The checking list has a numbered space for each student in the class; this number corresponds to his seat number. If the boy in seat 20 wants a bow pencil compass, he writes his name on line 20 and puts the letter "B.P.C." in a space left for that purpose after his name. When he brings it back he puts a check in a space left for that purpose. This checker also inspects the ink compasses and pens to see that they are brought back clean. At the end of the period, when everything has been brought back, he locks up the cabinet and places the checking list on a spindle on the teacher's desk for future reference.

Seven minutes before the class is to be dismissed, the superintendent again takes charge of the class with the words "Clean up." About a minute later he says, "Row one, put away your instruments." When most of the boys in row one have put away their instruments, he says, "Row two, put away your instruments," and so on, until all of the instruments are put away. The superintendent watches to see that the boys go in the order indicated so that confusion is avoided at the instrument cabinet. The checker of the instrument cabinet checks the drawers as the boys put them in their proper places. As soon as the boys in rows one and two get back to their seats, they put their supplies and drawings in their envelopes. The third and fourth rows generally have their envelopes ready before they are called on to put away their instruments. Each row foreman collects the envelopes in his row and places them on the front desk. The envelope foreman gets them and puts them in the drawers.

It is very important to have a good system of keeping records. If the boys know that an exact record is being kept of their work and progress, it is going to act as an incentive to secure that competition which all educators wish to secure, that is, competition with one's own past record. Such a record may be kept on the individual record card shown in Figure 6. Each boy is given one of these cards and all his marks are recorded on it for one semester. At the right are three columns, headed *grade*, *rate*, and *quality*. Detroit uses its own scale for lettering, and grade levels have been worked out from the 6A to the 9A grades inclusive. At the beginning of each semester an initial lettering test is given. This is followed at the end of the semester by a final test. After these tests have been graded by the teacher, the recording clerk puts the rate and quality on each boy's individual record card in the column headed *lettering*. For example, if a boy received a rate of 14, and a quality of 58, on his initial test, it will

be recorded as shown in Figure 6. Then the recording clerk takes a red pencil and crosses out the square that contains the rate of 14, and the square that contains the quality of 58. This shows, at a glance, that the boy letters at the rate of a 7A student with the quality of

INDIVIDUAL RECORD CARD

NAME _____ GRADE _____ SEC. _____

FIG.	SKET.	MECH.	PERS.	INK.	TRAC.	LET.	TEST	GR.	RATE	QUALITY
202	C	B		C+		13/58	80	9A+	24-25	68-71
211	C+	B		B			88	9A	22-23	64-67
224	C+	B-		B				9B	20-21	60-63
231		A		B-				8A	18-19	56-59
241	C-	B		B	B			8B	16-17	52-55
								7A	14-15	48-51
								7B	12-13	44-47
								6A	10-11	40-43
			INITIAL			14/58		6B	8-9	36-39
			FINAL			19/65				

FIG. 6

one who is doing 8A work. In case this boy is in the 9B grade, he will have to practice in order to come up to the standard of the 9B class; or if he be in the 8B grade, he will have to practice to increase his speed. Other tests given during the term are recorded in the same way, the grade levels being marked off in some other color. This enables the student to see whether or not he is improving, thus stimulating the feeling of self-competition which is, after all, what every teacher strives for and desires.

Because of large classes, the teacher may find it impossible to check all the drawings during class time, so once a week each class should be allowed to hand in the drawings that are ready to be checked. These drawings are then taken by the envelope foreman and put on top of the envelopes in one of the drawers. The instructor then checks these drawings and initials those that are made correctly, after which their number and mark are recorded on the class record sheet shown in Figure 7. At the next class meeting, the recording clerk distributes the checked drawings to the students to whom they belong and records the number and mark on the individual record cards from the class record sheet. Just as soon as a mark is transferred to the individual record card from the class record sheet, a line is drawn through the mark on the latter so that a glance suffices to show whose individual record card has not been brought up to date. The numbers and marks of drawings checked in the class are transferred immediately to the individual record card.

Just before the grading period, the record clerk collects all the cards and arranges them alphabetically. Then he takes a red pencil and draws a line under the amount of work done for the past six weeks. The next six weeks are indicated by another line of a different color, thus showing the amount of work done during each six weeks' period. This assists the students in noting progress and tends to stimulate self-competition.

In large classes one or more boys, who do exceptionally good work, are appointed as chief draftsmen for a given day. In some classes there may be as many as four chief draftsmen. It is their duty to give individual help where needed and check drawings. Each drawing so checked bears the initials of the checker, so that the proper person may be held responsible. This makes the chief draftsmen check very carefully and assists them to develop a critical attitude even toward their own drawings.

In the intermediate schools of Detroit each drawing room has one of Mr. F. R. Kepler's *Mechanical Drafting Handbooks*,[1] as a reference book for each drawing desk. Other reference books are kept on the teacher's desk and may be used by the student at any time during the class period.

CLASS RECORD SHEET

GRADE _____ SEC. _____ DRAWER _____ CORRECT _____

RECORD CLERK _____ TIME OF CLASS _____

SEC.	No.	NAME	SKETCHES	MECHANICALS	PERS.	INK	T.
	1						
	2						
	3						
	4						
	5						
	42						
	43						
	44						
	45						

FIG. 7

A casual reading of this plan of organization may create, in the minds of some, the impression that it is complex and laborious, but after using it for two years, it has been found very effective and helpful. Not more than five minutes at the beginning and end of each period are set aside for starting or cleaning up. All but the chief draftsmen serve for one semester, unless it is found necessary to make a change.

[1]Published by The Bruce Publishing Company, Milwaukee, Wisconsin.

A Summer-Camp Project

*Frank M. Barsby**

WITH the growth of the summer-camp movement throughout the country, many shop teachers are turning to this field of activity for a pleasant, profitable summer. The modern camp demands as leader or counselor, one who gets along well with boys and who, besides teaching a specialty, can take a prominent part in the varied camp activities.

Camping for a counselor is not primarily a vacation

*Lower Merion Schools, South Ardmore, Pennsylvania, and Kennebec Camp, North Belgrade, Maine.

but a job. It may be recreation, as hard work can often be great fun; but the job of a counselor is one of conscientious, patient, sometimes tiring, professionally technical work. It is a constant and unremitting task throughout the hours of the day.

A good counselor should set an example of good humor, high ideals, and consideration for others. He should be coöperative in his attitude and feel a personal responsibility for helping to achieve the higher values for which the progressive camp stands.

Camp workers have found that a well-balanced program of activities is essential to hold the interest of the boys and to get every boy happily and profitably occupied. The better camps besides athletic activities, such as baseball, soccer, horseback riding, tennis, boating, swimming, and boxing, offer dramatics, photography, nature lore, trail blazing, woodwork, metal and leather craft. Each camper must be exposed to the various camp activities.

The writer has for the past few years been connected with one of the larger camps in Maine in the capacity of woodshop instructor. Our camp shop offers a diversified program of leather, metal, and woodcraft, each under separate leadership. Class instruction is given in the morning, and free periods are numerous in the afternoon program and on rainy days. On these occasions it is not uncommon for half the camp population to be actively engaged in shopwork.

Leatherwork has proved to be a very popular activity. Few tools are required and with a small initial expense a suitable outfit can be obtained. The larger leather companies provide instruction books and patterns, and beautiful work can be turned out with a little patience and experience. Among the popular articles in our shop were belts, purses, stationery holders, lanyards, bill folds, and book covers.

Metal work is another fascinating occupation and a few boys could be found in the shop at almost any hour. A wide variety of projects may be offered, including candle holders; ash trays; desk sets; pin trays; book ends; in hammered brass, copper, and finer metals. Lead casting is available for the more apt pupils and competition is keen for those who wish to be permitted to cast their own book ends, etc.

The woodshop program with which the writer is directly concerned embraces some projects of the school shop variety and many which are native to the camp. The former consists of bird houses, stools, model sail boats, airplanes, book holders, etc., while the latter consists of rustic furniture, rustic fern bowls, candlesticks, ash trays for dad, whittling, and back rests for canoes.

However, the most interesting project ever attempted at our camp was built outside the shop, and stands as a monument to the energy of a group of youngsters. It is a large beautiful cabin built to house specimens.

Our nature department was showing much industry in gathering insects, leaves, and other beautiful specimens; but was handicapped by the lack of housing facilities.

At first, the camp director contemplated the purchase of a cabin, but after a conference of shop teachers it was decided it could be built at a saving, and provide an excellent project for the entire camp.

We scouted the countryside, and were fortunate enough to locate a sawmill where we could secure split cedar logs, jointed on the edges and surfaced on the flat side. The edges were grooved for a spline and the bark stripped off on the outside.

Of course it was not possible for boys of camp age, 10–13, to build the cabin in its entirety, but under close supervision the majority of the cutting and nailing, and some layout work, was done by the boys.

A splendid location was cleared among the trees near the athletic field, and on the appointed day a host of volunteers were all ready for work. Much of the foundation work was done by the leaders, but when it came to the flooring, the hammers of as many as could find a space beat a steady tattoo on the boards. Of course some nails were bent, and there are plenty of hammer marks still showing, but progress was made. Then the studs were cut to length and soon the four sides were erected. After a pattern was made the more skillful

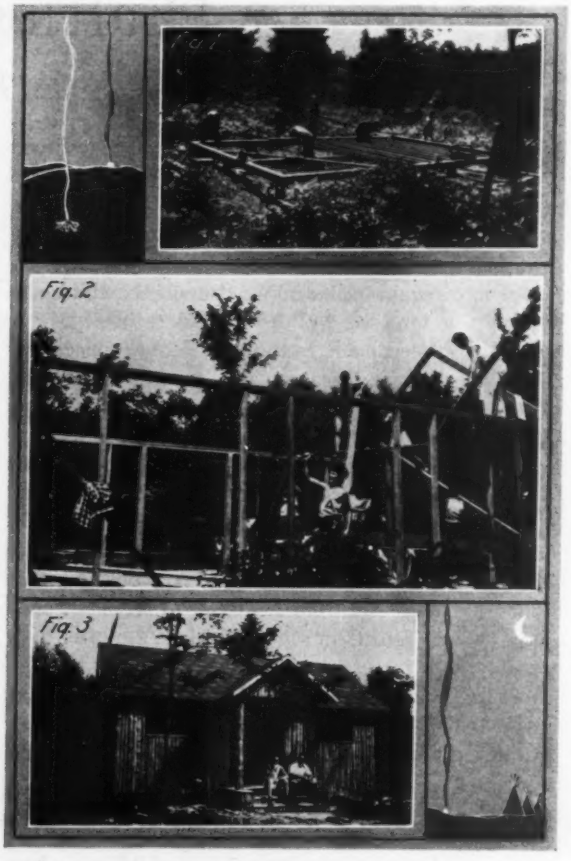


FIG. 1. LAYING THE JOISTS
FIG. 2. RAISING THE ROOF
FIG. 3. THE COMPLETED CABIN

boys cut rafters. Interest ran high and as the roof took shape there were more workers than could be kept busy. Then when the roof was sheathed all hands were busy again cutting and nailing.

In the meantime some campers started to build a flagstone walk from the ball field to the cabin while still others removed small stumps and filled depressions in the immediate vicinity.

Then the nailing on of the slabs of cedar was begun, and the leaders had to do the fitting around doors and windows, the straight stretches were easily taken care of by the more youthful workers.

An entrance porch was built at the front, supported on two 12-in. cedar posts. Composition shingles of a mottled reddish variety were used on the roof and these blended in with the mellow golden color of the cedar slabs which had been treated with a coat of oil preservative.

The double doors had glass full length and were given two coats of orange shellac, after which they were varnished to blend with the surrounding walls. The windows were built high and long to admit as much light as possible.

Pine trees and small shrubs were then planted around the outside, and during the last week of camp the finishing touches were applied. Then came the dedication. Each boy placed his name on a scroll, and this along with some coins and other relics was nailed in a box and ceremoniously fastened to a joist under the floor. Amid red flares and the glow of a huge camp fire speeches were made and the museum was officially turned over to the nature department. Every one of the 80 boys had contributed some bit of effort to the project.

A year has elapsed since its completion, and the collections of nature work, nests, plants, and odd formations is continually growing. Classes are held there on rainy days, and those workers who participated in its erection are exceedingly proud when they return for a summer's camping.

Hygiene of Vision in the School Drafting Room

*A. K. Rigast**

NEVER before in man's history have his eyes been subjected to such a strain as today. They are intensively used from early childhood to old age under varying conditions with the resulting strain and detrimental effect upon them. Never before have there been such severe requirements imposed upon the children's eyes as are imposed by the modern school. Many studies have been made in the past decade concerning visual acuity, eye diseases, and functional defects. These researches have revealed the startling fact that a considerable proportion of school children suffer from defects of vision, "the result largely of continued use of the eyes in close work under unhygienic conditions." According to Professor Terman's figures, there are in the United States from 10 to 15 per cent of the school children who have seriously defective vision. This means that there are from 2,500,000 to 3,750,000 such pupils. Visual defects in school children are often progressive and increase with their progress through school. Defective vision, therefore, is found to a greater extent among older children.

Children with defective vision are retarded in their progress in schoolwork, and they may soon become problem cases in and out of school. They thus may enter upon their race in life seriously handicapped. Will they succeed? May not many of such children eventually become community charges or a social menace?

*High School, Sacramento, California.

Children are compelled to go to school by law. This fact categorically implies the provision of the best working conditions on the part of the school. One of these is proper and adequate lighting which is of prime importance. Poor or improper lighting causes eyestrain and eye fatigue which result in functional disorder, nearsightedness, "to which the immature eyes of children are especially susceptible."

How does this situation affect the school drafting room? It is an admitted fact that no other school subject requires as much visual concentration upon the work as drafting does. Hence, the working conditions of the drafting room should be of the best. It is imperative that the instructor of drawing know what good working conditions are, for his responsibilities lie not only in the teaching of the subject, but also in the preservation of the health of the child.

Keeping the preceding facts in mind, let us now consider the measures to be taken in the school drafting room in order to safeguard the child's health in general and his eyesight in particular.

Elimination of Glare

Glare should be avoided because it (1) tends to injure vision, (2) interferes with clear vision, (3) causes discomfort and fatigue, and (4) causes disturbance of the nervous system.

Glare may be defined as any brightness within the

field of view of such a great intensity as to cause physical discomfort, interference with vision, and eye fatigue.

There are a number of causes which produce glare:

1. One of these is the intrinsic brilliancy of the light source, that is, the candle power per square inch of area may be too great. The sun is such an extremely bright light source. No naked eye can be exposed to it without causing great physical discomfort and temporary blindness. The headlights of an automobile may also cause discomfort, although the annoying effect is not quite so great as that produced by the sun.
2. The total volume of light stream in the direction of the eye may be too large.
3. The contrast between the light source and its darker background may be very great. Everyday experience proves that a light source even of relatively low intensity viewed against a dark wall is infinitely more trying to the eyes than the same thing seen against a light background.

Experience has shown that an unshaded window quite often causes glare, due to the large volume of light that enters the room rather than to the brightness of the sky. Likewise, if a 500-watt lamp in a 10-inch translucent globe is hung 8 feet above the floor and the same distance in front of the pupil, the glare thus produced will be just as annoying as that of the exposed filament of a 50-watt incandescent lamp placed in the same position. The glare is produced by the total volume of the 500-watt lamp rather than by its brightness, and the effect on the eye is worse than that of the bare filament of lower candle power.

If, on the other hand, the source of artificial light is placed at a height where the line through the light makes an angle of 25 degrees with the line through the object in the field of vision, glare is reduced to zero, irrespective of the candle power of the lamp. In other words, if the 500-watt lamp be placed 80 feet away from the observer, no discomfort would result, because "at this distance the total quantity of light entering the eye would be only one one-hundredth of that received at 8 feet."

It is a known fact that the eye is extremely sensitive to glare coming from below, as from water, white sand, or snow, because the volume of the reflected light which enters the eye is extremely great. Then too, sufficient light is reflected from shining desk tops to cause discomfort and eye fatigue. Even white drawing paper has a reflection factor of 80 per cent, whereas cream-colored paper has only 56 per cent. The white paper reflects four fifths of the total light thrown upon it into the student's eyes. Such a great volume of light flux forces the eye mechanism to make sudden adjustments, which inevitably produces eye discomfort. It is evident that cream-colored paper is preferable to white paper. There is no reason why white paper should be used at all in school drafting rooms. The reflection factor of cream-colored paper is relatively low; it is agreeable to the eye, and it fulfills the same requirements as the white paper does.

The total volume of a light source, therefore, is of great importance, and must be taken into serious consideration whenever the question of avoidance of glare arises.

Continuous exposure to glare, whether direct or indirect, results in lowered efficiency and increased eyestrain; and if the eye is afflicted with some defect as astigmatism, the strain on the eye is tremendously increased. The net result may be a permanent injury to the eye.

What are the signs of eyestrain? The symptoms of eyestrain may be readily perceived by the observant teacher. They are: painful eyes; spasms of the eyelids; itching, smarting or watering of the eyes; congestion of the eyes; sensitiveness to light; frowning; blurred vision; headache; fatigue; nervousness; and nervous despondency.

It should not be understood that eyestrain may be produced only in the school drafting room. There are other places in the school where the pupil's eyes may be abused by improper lighting conditions. This situation does not, however, lessen the responsibilities of the drafting department. Whenever any of the foregoing symptoms are observed in the pupil's eyes, he should be sent without delay to the school nurse, and if this aid is not available, it should be insistently suggested to the child's parents to take him to an oculist.

The specific measures observable in the school drafting department to obviate glare, are:

1. The drawing-room desk tops should never have shining or glossy surfaces, from which the light might be reflected as from a mirror into the eyes of the student. The desk tops should have dull or mat surfaces, because a mat surface breaks up bright light and reflects it in all directions. A dull surface can be obtained either by rubbing down the shining surface with pumice stone and water, or by rubbing the unfinished desk tops with hot linseed oil, which soaks into the wood, and drying produces a hard and dull surface.
2. All exposed light bulbs should be either frosted or inclosed in frosted or prismatic glass globes, which diffuse the light so that it seems to come from the whole surface of the globes.
3. Walls finished in hard and white plaster and left in their natural state are very objectionable because of their high reflection factor. They should always be tinted: ceiling ivory or cream color, the walls buff.
4. The T squares should never have shining surfaces.
5. Cream-colored paper should be used in preference to white paper.
6. The glare from blackboards is quite often very pronounced. This is principally due to cheap substitutes, which do not always have completely mat surfaces. Slate blackboards are the best: their surfaces are absolutely dull and roughened, and effectively break up and diffuse the light rays. The blackboards should never be placed near to or between windows.
7. Textbooks with glossy paper should be avoided.
8. The natural position of the eye during rest periods is in the horizontal plane. All light sources that come near or within this plane or line of sight cause glare. Therefore, all light sources should be located well up toward the ceiling. The use of local lamps — placed close to the work — in the school drafting room should be discouraged, and if they are used at all, they should be well screened.

There is no reason why glare should not be entirely eliminated from the school drafting room. The fore-

going suggestions are practical and can be put into operation without much extra cost or work.

Natural Lighting

The source of glare is light, whether natural or artificial. Without light there is no glare. The discussion of light, therefore, follows in logical sequence; but before we can proceed, a few technical terms should be explained: candle power, foot-candle, lumen, luminaire, and reflection factor.

Candle power: Originally the candle power was an English unit, and the "standard candle was defined as the old parliamentary candle of sperm wax, of the size known as 'sixes' (six to a pound), burning 120 grains of spermaceti an hour." One candle power is about equivalent to one watt consumption in a tungsten lamp.

Foot-candle: This may be defined as a unit of intensity of illumination received at a point one foot distant from a source of one candle power. In other words, one foot-candle is enough to furnish illumination on one square-foot area (see Figs. 1 and 2).

Lumen: This is the amount of light falling on one square-foot area of which all points are one foot distant from a light source of one-candle-power intensity (see Fig. 3).

Luminaire: This may be defined as a complete lighting unit which consists of the light source, globe, reflector, refractor, housing, and support.

Reflection factor: This is the ratio of the light reflected from a given surface to the total light falling on the same surface.

Keeping the foregoing in mind, let us now take up the discussion of natural lighting. Experience demonstrates the fact that eyes are rested in darkness. Nature provides rest for the eyes which comes with sundown. Darkness or semidarkness seems to be the ideal condition as far as eyestrain and eye fatigue are concerned. Man, however, cannot live in darkness. Our eyes are best adapted to a natural lighting situation. Since lighting out of doors does not change rapidly in intensity, the eye mechanism has ample time to make the necessary adjustments gradually and this makes retinal adaptation easy; but if the change from bright to dim and dim to bright is sudden, the retinal adjustment cannot be made to meet these extremes in very

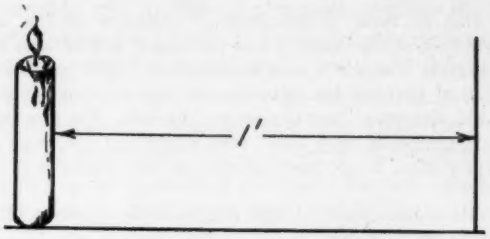
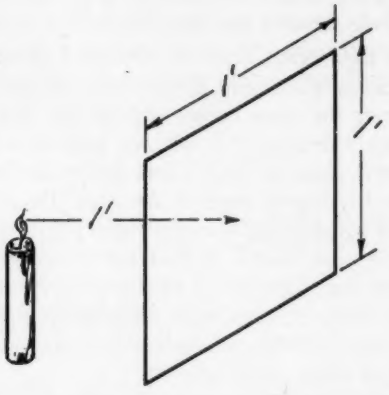
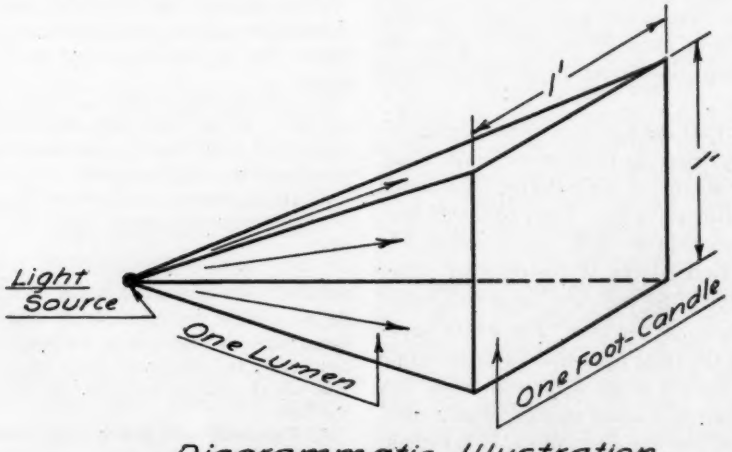


Fig. 1 One Foot-Candle



Diagrammatic Illustration Of One Foot-Candle Of Illumination

Fig. 2



Diagrammatic Illustration Of One Lumen

Fig. 3

short time intervals. It is true that the pupil reacts to an increase or decrease of light either by contracting or expanding in size, nevertheless a continuous subjection of the eye to extreme light fluctuation will result in discomfort and tremendous falling off in the visual efficiency for the time being. Long-continued exposure of the eye to bright light causes retinal exhaustion, and instead of being blunted, the eye becomes hyperesthetic, and finally unable to bear any exposure to bright light at all. The eye, therefore, should never be subjected to extreme and sudden changes in brightness, as for instance, sudden raising of all shades and flooding the room with bright light.

What amount of light is necessary in order to do a task well and with dispatch, and without causing eyestrain? Individuals differ. The amount of light depends upon the work to be done, and the sensitiveness of the eyes. It would be ideal if it were possible for each individual to determine the amount of light he needs. This, obviously, is impossible. First, the pupil does not know how much light he needs, and secondly, a school that is attended by hundreds of pupils cannot provide individual lighting. Sufficient and proper lighting can only be provided for individuals with normal, healthy eyes. Special cases require special treatment.

What lighting then should be provided for the healthy eye? It is generally assumed that the room which is best lighted is most lighted. This assumption is not correct, however, because intense light decomposes the visual purple faster than it can be restored, and the result is retinal exhaustion and eye fatigue. It is self-evident that effective lighting permits one to see and to act with certainty, speed, and comfort. Speed of vision is an important factor in production whether in school or elsewhere. This speed of vision is greatly influenced by the quality of light, intensity of illumination, and the distribution of light.

Intensity of illumination indoors varies greatly. Where outside light intensities are measured in thousands of foot-candles, they are hardly measured in hundreds indoors, the range being from almost zero to one hundred foot-candles. Physiologists agree that a light source having a specific brightness of from 4 to 15 candle power per square inch is a safe working standard for the eye. In the table below is indicated the recommended amount of light in foot-candles necessary for the different activities in the school:

	Recommended Foot-Candles	*Permissible Under Some Conditions*
Auditorium	5	4 to 8
Classrooms, library.....	8	5 to 10
Drafting rooms.....	15	10 to 20
Laboratories	10	6 to 12
Manual training.....	10	6 to 12
Sewing rooms.....	15	10 to 20

This table, as worked out by illumination experts, reveals the fact that drafting is the school subject which requires the greatest amount of lighting. The reason is obvious. Drafting is an activity that demands an almost ideal lighting situation. It is an error to assume that good, to say nothing about ideal, lighting prevails in all school drafting rooms. In many instances deplorable lighting situations exist, usually because the authorities are ignorant of drafting-room requirements. It is necessary for the instructor, therefore, to take the necessary remedial measures, if poor lighting conditions exist in his room. Before he can do anything constructive, he must orient himself as to the quality and quantity of natural or artificial lighting necessary in the school drafting room.

There seems to be an agreement among teachers of drafting that daylight coming through saw-toothed skylights facing north is superior to lighting obtained through windows irrespective of their exposure. The light thus obtained is uniform in intensity and in color, and the shadows on the drawing are reduced to an absolute minimum. Skylights, therefore, constitute an ideal lighting situation. But how many school drafting rooms are thus equipped? Very few, indeed. In many instances the drafting department is the result of an afterthought. In case of congestion in the school, it is moved from pillar to post, and therefore functions under adverse conditions.

If skylights are out of the question, what other exposure should be desired? There seems to be no unanimity either among teachers of drafting or among industrial draftsmen as to which exposure is most desirable. The choice of an exposure is determined largely by the idiosyncrasies of the individual concerned. Nevertheless, a closer examination of this question reveals the fact that one exposure is preferable to all others.

Let us, therefore, discuss each exposure briefly and separately. The eastern sky is the brightest in the morning. The intensity of the light is great, and the room is flooded with a great volume of brightness. In order to reduce the intensity and diffuse the light, window shades must be resorted to. The use of shades reduces the illumination values considerably. This cutting down in illumination may be materially greater than is desirable for effective vision. The result of this situation may be eyestrain and eye fatigue. In the afternoon the eastern exposure is in the shadow, and the intensity is therefore greatly reduced. This tremendous variation in light values is not a desirable feature and this exposure should be avoided by all means.

The same applies also to the western sky with a reversed situation: shadow in the forenoon, brightness in the afternoon.

The southern sky is much less variable in brightness than the eastern and western skies. In the late spring and summer no objections can be raised against the southern exposure of the drafting room because the sun is high in the sky and does not shine directly into the room. In late fall and winter a different situation arises. The sun is low in the sky, and therefore the room is flooded with light practically the whole day long. Again, in order to reduce light intensities and obviate glare at this time of the year, window shades must be used. For obvious reasons this is undesirable.

(To be Continued)

INDUSTRIAL ARTS and VOCATIONAL EDUCATION

J. J. METZ, Editor

WHOSE RESPONSIBILITY— SUPERINTENDENT'S OR TEACHER'S?

Convention speeches are frequently inspirational, enlightening, informational, or constructively critical. At times, however, they are accusatory, denouncing, or destructively critical.

It is especially during the present critical period that school superintendents and principals feel themselves called upon to oratorically and oracularly exhort the teachers of industrial-arts work that it is up to the shop teacher to sell his subject to the public.

This advice is quite trite and commonplace. It is a part of every job in the world — that of selling the idea that a particular job be intrusted to a certain individual.

There is no industrial-arts teacher-training department where the fact that the teacher's work must impress the public with the worth of the work which he is offering, is not emphasized in season and out of season, and yet these administrative gentlemen make these statements out in public, with a gesture which implies "you industrial-arts and vocational teachers — listen to me — I am telling you something that you ought to hear about and take to heart."

It has often been said that the success of any school depends upon its classroom teacher. There is much truth to that, but the selling of any educational idea is not the teacher's primary function. True, his work must be of such a high caliber that his subject can be viewed from all angles and pronounced worthy, but its worthiness must also be based on other factors such as an ethical or practical need.

The superintendent of schools, or the principal must first of all have sufficient vision to see that a certain subject should be placed in the curriculum. If that subject be of the nature of an innovation, it is part of the administrator's duties to demonstrate that it has a place in the curriculum and should be embodied in it. The teacher of that subject must then help to prove this contention by teaching it in such a manner that the objectives set up for the work, are met.

If a teacher of English, mathematics, history, geography, civics, or science does not quite measure up to the standards set in any school system, he is dropped and has to look for a new job. This is just ordinary common business procedure. Is not industrial-arts work also one of our American school subjects? Cannot it be handled in the same way?

If an industrial-arts or a vocational teacher is not fit to teach his subject — there are many who can replace him and do justice to the work. It is about time that the old saying, "The teacher is one who cannot make a success of anything else" be forever killed.

Teachers, as a whole, are as well prepared, and as able to take care of their work as any other professional body. The individual teacher is placed in a position with directions to do a certain job. Surely those who placed him in that position ought to be sure that he is needed there. Surely they did not hire him merely to give him an opportunity to do something that might be needed if he proved that it was worth while.

A superintendent or a principal must first know what he wants before he can give intelligent directions to others. It is not necessary that he be an industrial-arts teacher to know that he wants that subject taught, but he must know quite definitely just what he wants to accomplish with that subject in his school. It is he who chooses to put it in the curriculum and it is up to him to prove that his choice was wise and necessary.

In those cities where the industrial-arts and vocational work was discontinued, it is an admission by the educational authorities that they look upon the work so dropped as the least worth while in the curriculum. Probably it was the least valuable — but if it was, the blame may belong partly to the teacher, but in a much greater measure it belongs to those in administrative positions who allowed inferior work to be continued.

VOCATIONAL EDUCATION

The House Economy Committee's proposal to cut the federal aid given to states offering vocational education under the Smith-Hughes Act, has fortunately been killed.

According to statistics gathered by Mr. P. W. Reeves, member of the Federal Board for Vocational Education, $32,139,192 was spent for vocational education during 1931. The amounts spent for the entire field of education during the same time was $3,200,000,000. From this it may be seen that the entire proposal was based on a short-sighted policy, as only 1 per cent of the funds expended for education in the United States was given to vocational education, although 90 per cent of the population is employed in nonprofessional occupations.

Taking into account that the money spent for vocational education affects such a large percentage of our population, and that the vocational work would have been seriously curtailed had the proposal of the Committee carried, the vocational-education men may justly feel jubilant.

The growth of vocational education under the stimulus of the Smith-Hughes Law has been phenomenal. In 1917, when the Smith-Hughes Law was passed, the enrollment in all vocational schools throughout the entire country was approximately 20,000. In the fiscal year 1918 this enrollment, because of the law, grew to 164,000. By the end of the year 1931 it had reached the astounding figure of 1,126,385.

That the individual states realize the value of the work is fully shown by the fact that the federal dollar has been more than matched by state and local money. For the year 1931, $3.03 of state and local money was

expended for each dollar of federal money. While this is more than three times the federal subsidy, nevertheless, had the federal contribution been cut or withdrawn, vocational education throughout the United States would have been seriously handicapped.

REDUCING SCHOOL BUDGETS

Any reducing of school budgets ought to be done with calmness and deliberation. That the need for reduction of expenditures for all governmental functions is necessary cannot be denied, but the slashing ought not to be done promiscuously.

Economy ought, of course, be the watchword whenever public monies are used, but there is a wide difference between practicing economy and the ruthless lopping off of educational opportunities because by crippling these, the youth of our land are made to suffer losses which may react adversely for many years.

The abolishing of this or that department in a school system, in order to reduce expenses, is merely robbing Peter to pay Paul. One branch of education under such conditions becomes the Cinderella who suffers so that the more favored children can live in ease.

Cutting teachers' salaries may be an efficient method of gaining funds available for other expenditures, but the effect of the reduction may be much more far-reaching than is usually imagined.

Teachers have never been adequately paid. Low standards, and the easing of even these, in order to get the help that was needed at the low wages paid in the past, were the fault of filling educational positions with men and women of less than mediocre abilities or the cause of making capable teachers work for wages not even offered for common labor.

During the years immediately following the world war, the outlook for the teacher became somewhat brighter. Salaries were raised, and with them standards were created that gradually attracted and held a better-prepared corps of men. Compared to other professions demanding the same preparation, teachers' salaries were still low, but they did rise to a level which permitted teachers to live at least decently.

It is true, workers in industry have suffered salary cuts and thousands have lost their jobs. That, however, is no reason why teachers who have to be on the job more than ever because of increased class size, increased extracurricular activities, and changing methods of instruction should suffer salary reductions. Their pay does not rise as rapidly as does that of the commercial or industrial workers, hence it ought not to be tampered with in this crisis. Furthermore, teachers as a whole must share and contribute to civic funds of all kinds to a much greater extent than workers in other lines are asked to do. Teachers must also keep up a plan of self-improvement through continued study, educational research work, subscribing to professional books, magazines, and the like, membership in professional organizations, all of which take money which most other workers do not have to think about nor to expend.

While retrenchment is necessary to meet conditions as they are, it is better to look over our political machinery and carefully scrutinize it for those activities that can be curtailed or temporarily eliminated without interfering with the machinery which is to prepare the future citizens of our country. There are a great many government positions that have been created to give some political henchman an appointment. There are Bureaus and Commissions which may have done some good work, but which have outlived their usefulness. There are part-time and full-time counseling jobs which have been given to favorites with salaries and incomes in proportion to the favor which these salaries were expected to purchase. Curtailment and probable abolition of expenditures of this kind ought to be effected as a matter of policy. If this were done the country over, the money saved would be sufficient to make the cutting of teachers' salaries unnecessary.

HELP WANTED — NOT SYMPATHY

A few months ago, a well-known electrical instrument company entered a merger, and as a result many of its workers were thrown out of employment. According to the time-honored custom, these employees might have been thrown on their own resources and allowed to shift for themselves. There was a humane executive at the head of this absorbed firm, however, and he took it upon himself to help place these people. He accordingly had a folder prepared which carried the name, age, details of education, salary, length of service, and nature of work done, of each of these displaced men.

This folder, accompanied by an explanatory letter, was then sent out to other firms who probably could make use of the skills these workers possessed. Furthermore, prospective employers were invited to send in detailed requirements, and men best suited to their needs would be chosen and sent for an interview.

The action of the executive who conceived of this method of helping the men who had worked for him, is truly commendable. It is one of those things that prove that employers are not vampires which seek to suck the lifeblood out of the workers and then drop them when further need for them disappears.

In these days, when only too frequently worthy teachers find themselves without employment because departments in which they have worked cease suddenly to exist — can they hope for such humane treatment? Naturally, a man without a job is supposed to do all in his power to provide himself with another as quickly as possible. A little proffered help, however, will cheer up such a teacher and help him keep up his morale. Incidentally, it may help him locate a position much more quickly that he could otherwise obtain.

The school in weathering the present storm, can well adopt the valuable lesson taught by the humane act of this industrial employer and help those of its teachers who, because of present economic conditions, must go out and secure a new place.

Improving the Printing Course by Means of Testing

*Harold G. Crankshaw**

THE realization that accurate information regarding student capacities and abilities is one of the first steps in efficient instruction led to the study herewith presented. The study attempted briefly:

1. To learn more about the student, and in that way be enabled to improve the method of teaching.
2. To obtain information which might be used in guiding the student toward that particular phase of printing for which he is apparently best fitted.
3. To secure reliable information regarding the achievement of the student which will be helpful later in placement work.
4. To find a prognostic test if possible, which will give an indication of the probable success of the prospective student in his chosen vocation.
5. To determine if one set of characteristics which produce superior work in one branch of printing produce superior work in another branch of the industry.

With these objectives in mind, records were kept of a representative student group of varied age, experience, and training. Those in the study were unaware of the survey being made.

Objective measurements were made use of as much as possible to secure the data for this study. The linotype ratings were an exception, as they were obtained as estimates made by the instructor. This teacher had no knowledge of the student's standing in any other course or tests, however.

Each student was given a standard mental-ability test. When there was any question as to a student's score, an alternate test was given. As all students were over 16 years of age, the total score was sometimes used as the rank basis in figuring correlations rather than the actual I.Q. The rank correlation was used most often because of the ease of computation and the difficulty of measuring the time element on a percentage basis.

Students, who entered during the present school year were also given a mechanical-aptitude test. All of these scores were entered on an individual record card which contained other information concerning the achievement in the course of study and anything else which might influence the achievement ratings (such as previous printing-plant experience, printing courses in former schooling, and so on).

Only students taking the regular course were included in the study. The same number of problems were required of all and about 75 per cent were identical problems, the remainder being similar in size but being subject to the student's own interpretation of layout (advertising composition).

The course in hand composition is so designed that the time of completion depends upon the student's own initiative. Problems do not necessarily come in sequence except for the basic unit operations.

Time records are kept on all problems in addition to the final O.K. when the workmanship meets the approval of the instructor. The problems in advertising composition are additionally rated (time, spacing, choice and display of type, errors, and workmanship) though an insufficient number of students have completed the work to date to give significant results.

The monotype and presswork were appreciation courses and covered periods of one week only. The tests in hand composition, presswork, stonework, and part of trade mathematics were true-false and completion-type achievement tests of trade knowledge.

Table I shows the correlation between the mental-ability test and the mechanical-aptitude test. Both are given in percentages of the total possible score correctly worked. A previous table gave the correlation for 11 cases at +.52 by rank and +.56 by percentage. This table, with 20 cases, shows a correlation of +.53 by the rank correlation method.

TABLE I

Correlation — Mental-Ability and Mechanical-Aptitude Tests

Mental-Ability Test Score[1]	*Mechanical-Aptitude Test Score*[1]	*Mental-Ability Rank*[2]	*Mechanical-Aptitude Rank*[2]
90	84	1	5
86	79	2	7
85	96	3	1
83	85	4	4
81	48	5	17
79	68	6	11.5
77	75	7	9
76	69	8	10
75	53	9	16
74	78	10	8
68	68	11	11.5
67	55	12	14
60	89	13	2.5
52	89	14	2.5
47	35	15	19
39	83	16	6
37	66	17	13
33	54	18	15
22	33	19	20
21	44	20	18

Coefficient of correlation, +.53.

Number of cases, 20.

Mental-ability test score — mean, 63 per cent; median, 71 per cent.

Mechanical-aptitude test score — mean, 67 per cent; median, 69 per cent.

I.Q. Mean 101; I.Q. Median 106.

[1]Mental-ability test used — Terman Group Test of Mental Ability; mechanical-aptitude test used — Stenquist Mechanical-Aptitude Test — Part I.

[2]Figures in first two columns represent percentages of total possible score in tests.

These students are still in school and their achievement records are to be checked with the foregoing tests when their courses are completed. The coefficient of correlation between mental ability and mechanical aptitude as measured by the tests while not high, is significant.

Table II shows the relation of mental ability and time

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required to complete the problems of the course in hand composition. This table shows the results obtained from 23 cases.

TABLE II

Correlation — Mental-Ability Test and Time Required to Complete Course in Hand Composition

Mental-Ability Test Score (Total)	*Time on Problems (Weeks)*	*Mental-Ability Score (Rank)*	*Time on Problems (Rank)*
195	13	1	22.5
189	10	2	13
175	8	3	8
174	5	4	2.5
172	7	5	6
169	9	6	10
167	10	7	13
166	5	8	2.5
164	5	8	2.5
162	12	9	19
155	12	10	19
151	5	11	2.5
146	6	12	5
142	8	14.5	8
142	10	14.5	13
133	8	16	8
129	12	17	19
122	12	18	19
108	10	19	13
89	10	20	13
56	12	21	19
49	13	22	22.5
48	11	23	16

Number of cases, 23.
Coefficient of correlation, +.21.
I.Q. — mean, 101; median, 110; Total score — mean, 139; median, 151.
Time required to complete course in hand composition in weeks — mean, 9.3; median, 10.
Age used for computing I.Q. — 16 years.
Time required to complete course in hand composition based upon 39-hour shop week, absences deducted.

The correlation presented in Table III is more representative of the training of the student than shop time alone — trade knowledge being an essential part of the student's training. The rank scores shown were determined by taking the average between the time required to complete the problems and the score made in the final examination in trade knowledge.

Other factors presented themselves from the data regarding the length of time required for the course in hand composition, among them being the relation of age to the time required. While the coefficient of correlation is only +.36 and while some of the age groups had but one frequency, the graph shows a tendency toward the older students doing the same amount of work in less time.

TABLE III

Correlation — Mental-Ability Test and Average of Hand Composition Shop and Final Examination Scores

Mental-Ability Test Scores (Totals)	*Hand Composition Average (Ranks)*	*Mental-Ability Test Ranks*
195	6	1
172	1	2
146	3	3
142	4	4
129	7.5	5
122	5	6
121	2	7
56	9	8
48	7.5	9

Number of cases, 9.
Coefficient of correlation, +.38.
Mental-ability test score — mean, 125.6; mid-score, 129.
I.Q. — mean, 97; mid-score, 98.

TABLE IV

Correlation — Age and Time Required to Complete Course in Hand Composition

Age	*Time on Problems (Weeks)*	*Age Rank*	*Time Rank*
32	8	1	8
29	5	2	2.5
26	7	3	6
23	10	6	13
23	5	6	2.5
23	13	6	22.5
23	5	6	2.5
23	11	6	16
22	12	9.5	19
22	6	9.5	5
21	12	13.5	19
21	12	13.5	19
21	9	13.5	10
21	5	13.5	2.5
21	10	13.5	13
21	8	13.5	8
20	13	17.5	22.5
20	10	17.5	13
19	12	19.5	19
19	8	19.5	8
18	10	22	13
18	12	22	19
18	10	22	13

Number of cases, 23.
Coefficient of correlation, +.36.
Age — mean, 21.9; median, 21.

A classification of the students also brought out some pertinent facts relating to the time required to complete the course in hand composition. The three chief sources by which the students maintain themselves while in school are listed with the time (in weeks) required to complete the work in Table V.

TABLE V

Correlation — Source of Maintenance and Time Required to Complete Course in Hand Composition

Time in Weeks Required by Students Who Are Sent by Parents or Guardian	*Rehabilitation-Bureau*[1]	*Students Paying Own Expenses or Borrowing Financial Assistance*
10	13	8
10	13	5
12	9	7
12	12	10
	12	5
	6	5
	8	5
	11	8
	10	10
		10
		10
Mean, 11 weeks	Mean, 10.4 weeks	Mean, 7.5 weeks
Median, 11 weeks	Median, 11 weeks	Median, 8 weeks

[1]All students in this group physically handicapped in some manner.

Table VI gives the scores and rank coefficient of correlation of the time required to complete the course in hand composition and the final examination in hand composition. The examination was to test the trade knowledge in the subject.

TABLE VI

Correlation — Time Required to Complete the Course in Hand Composition and Final Examination in Hand Composition

Time on Problems (Weeks)	*Final Exam. (Per Cent)*	*Time Rank*	*Exam. Rank*
6	80	1	5
7	91	2	1
10	76	3.5	6
10	88	3.5	2
11	49	5	9
12	66	7	7
12	54	7	8
12	85	9	4

Number of cases, 9.

Coefficient of correlation, +.24.

Final examination in hand composition — 1 true-false and 1 completion test.

Time on hand-composition problems — mean, 10.3 weeks; median, 11 weeks.

Final examination — mean, 75 per cent; median, 80 per cent.

The correlation between the hand-composition rating (based upon both time required for shopwork, 50 per cent, and final written examination, 50 per cent) and the all-round ability rating as a linotype operator is shown in Table VII.

TABLE VII

Correlation — Hand Composition and Linotype Operation

Hand Composition[1]	*Linotype*[2]	*Hand Composition (Rank)*	*Linotype (Rank)*
1.5	90	1	1
2.7	75	2	4
3	80	3	2
4.7	70	4	6.5
5	75	5	4
6.5	75	6	4
7	65	7.5	8.5
7	65	7.5	8.5
7.5	70	9	6.5

Number of cases, 9.

Coefficient of correlation, +.75.

Hand-composition ranks — mean, 5; median, 5.

Linotype percentages — mean, 74 per cent; median, 75 per cent.

[1]Hand composition based upon average of ranks of final examination and time required to complete problems.

[2]Linotype score based upon estimate by instructor; percentages on speed, accuracy, and mechanical ability.

TABLE VIII

Correlation — Mental-Ability Test and Average of Ranks in Hand Composition (Shop and Trade Knowledge) and Linotype Estimate

Mental-Ability Test (Total Score)	*Hand-Composition (Average of Ranks)*	*Linotype Per Cent*	*Linotype Rank*	*Shop Average Rank*	*Mental-Ability Rank*
195	6	75	4	5	1
172	1	90	1	1	2
146	3	80	2	2	3
142	4	70	6.5	6	4
129	7.5	65	8.5	8.5	5
122	5	75	4	4	6
121	2	75	4	3	7
56	9	70	6.5	7	8
48	7.5	65	8.5	8.5	9

Number of cases, 9.

Coefficient of correlation, +.62.

Hand-composition average includes shopwork and trade knowledge.

Linotype percentage is based upon instructor's estimate of all-round ability.

TABLE IX

Correlation — Time on Hand-Composition Problems and Linotype Speed

Time on Problems (Weeks)	*Speed on Linotype Ems per Hour*	*Time on Problems Rank*	*Linotype-Speed Rank*
6	3,300	1	1
7	2,800	2	2
10	2,200	3.5	5.5
10	2,400	3.5	3
11	1,200	5	9
12	2,300	7	4
12	2,100	7	7
12	2,000	7	8
13	2,200	9	5.5

Number of cases, 9.

Coefficient of correlation, +.55.

Time on problems — mean, 10.3 weeks; median, 11.

Linotype ems per hour — mean, 2,277; median, 2,200.

Time in shop, both linotype and hand composition, 39 hours per week.

TABLE X

Correlation — Mental-Ability Test and Linotype Ability

Mental-Ability Test Score	*Linotype (Percentages)*	*Mental-Ability Score Rank*	*Linotype Rank*
195	75	1	4
172	90	2	1
146	80	3	2
142	70	4	6.5
129	65	5	8.5
122	75	6	4
121	75	7	4
56	70	8	6.5
48	65	9	8.5

Number of cases, 9.

Coefficient of correlation, +.52.

I.Q. — mean, 97; median, 98; Total score — mean, 125.6; median, 129.

Linotype — mean, 74 per cent; median, 75 per cent.

TABLE XI

Ranks Derived from Achievement Tests at Completion of Course

In Table XI hand composition, presswork, monotype, and advertising composition are all ranked from 1 to 9.

I.Q.	*Hand Composition*	*Probs. — Final Exam.*	*Advertising Comp.*	*Trade Math.*	*Monotype*	*Presswork*	*Stonework*	*Average of all Ranks (Achievement)*
1	9	5	1.5	2	5.5	2.5	3.5	4
2	2	3	4	3.5	2	1	2	1.5
3	1	3	1.5	6	3.5	5	5.5	3
4	3	6	9	3.5	3.5	4	3.5	5
5	7	7	8	1	7	7	5.5	6
6	7	3	6.5	7	5.5	8	7	7
7	3	1	4	5	1	2.5	1	1.5
8	7	9	4	8	8	6	9	9
9	5	8	6.5	9	—	9	8	8

The achievement rating derived from both the scores in hand composition and linotype are shown in relation to the mental-ability test in Table VIII. This shows a higher correlation than any of the other correlations.

A study to determine whether the more rapid students in hand composition were also the more rapid in linotype operation gave the results shown in Table IX. The cor-

relation coefficient of +.55 is significant though not a perfect indication.

The correlation between the mental-ability test score and linotype-operation ability is indicated in Table X. The coefficient of correlation is higher here than the result found in investigating the relation between mental-ability test score and hand-composition achievement.

Table X is a summary of the achievement scores by rank exclusive of the linotype ratings shown in Table XI. The methods used to determine the ratings are explained in the preliminary matter, objective tests whenever possible.

All scores except *time on problems* under *hand composition* are result of classroom tests of the true-false and completion type. Methods of rating shopwork have been developed since this study was made, which give a more accurate check on the work. (See Table XI.)

TABLE XII
Linotype Ratings — Estimated by the Instructor

Accuracy		*Speed*		*Mechanical Ability*		*All-round Ability*	
Per Cent	*Rank*	*Ems*	*Rank*	*Rating*	*Rank*	*Per Cent*	*Rank*
70	3.5	3,300	1	fair	4	80	2
65	5	2,200	5.5	fair	4	70	6.5
60	7	2,100	7	poor	8	65	8.5
80	2	2,300	4	fair	4	75	4
70	3.5	2,200	5.5	poor	8	75	4
50	9	1,200	9	fair	4	65	8.5
60	7	2,400	3	fair	4	75	4
60	7	2,000	8	poor	8	70	6.5
85	1	2,800	2	good	1	90	1

An attempt to find a prognostic test led to the use of a part of the Terman Group Test of mental ability as an indication of what the student would do in hand composition. The parts used were tests numbers 4 and 8 (logical selection and mixed sentences). The correlation found was high +.82 when used with the hand composition rating (shop and examination).

TABLE XIII
Correlation — Logical Selection, Mixed Sentences and Hand Composition

Logical Selection Mixed Sentences[1]	*Hand Composition*[2]	*Logical Selection Rank*	*Hand Composition Rank*
89	6.5	1	6
82	1.5	2	1
64	3	3.5	3
64	4.7	3.5	4
58	5	5.5	5
58	2.7	5.5	2
50	7	7	7.5
37	7.5	8	9
17	7	9	7.5

Number of cases, 9.
Coefficient of correlation, +.82.
Logical selection and mixed sentences — mean, 66 per cent; median, 58 per cent.
Hand-composition ranks — mean, 5; median, 5.

[1]Logical-selection and mixed-sentence tests from Terman Group Test of Mental Ability — percentage of possible score given.
[2]Hand composition based upon average of ranks of hand-composition final examination and time required to complete shop problems.

The final and most significant correlation presents the relation found between the arithmetic test of the mental-ability test, and the achievement test in the course in trade mathematics. This coefficient of correlation was derived from the Pearson percentage formula for the coefficient of correlation. This correlation is shown in Table XIII.

TABLE XIV
Correlation — Arithmetic on Mental-Ability Test and Trade Mathematics

Mental-Ability Test Score (Percentage)	*Trade Mathematics Achievement (Percentage)*
88	90
71	85
63	95
58	85
54	75
50	65
25	80
21	35
12	30

Number of cases, 9.
Coefficient of correlation, +.86.
Mental-ability arithmetic test (taken from the Terman Group Test of Mental Ability) — mean, 49; median, 54.
Trade mathematics achievement — 71; median, 75.
The course in trade mathematics consists of 10 one-hour classes. The final grade is determined as follows: 50 per cent homework and 50 per cent final examination.

The possible conclusions which might be arrived at from the study to date, subject to further study and experimentation, may be summarized as follows:

The mental ability and mechanical aptitude as measured by standard tests show a positive and significant coefficient of correlation.

The mental ability and shop speed, as found in hand composition, show a positive but insignificant correlation, whereas the study shows that shop and trade knowledge correlate higher with mental ability.

Older students tend to complete the shopwork in less time, the reason possibly being that incentive and seriousness of purpose, or wider experience and manipulative skill, are greater in the older students.

Students attending school on their own initiative and expense are far superior to others in time of completing work.

The most rapid students in shopwork do not necessarily retain the greatest amount of trade knowledge — the coefficient of correlation being positive but low.

Students having better than average ability in hand composition also have better than average ability in linotype operation.

Students of high I.Q. have better all-round averages than students of low I.Q.

Rapid progress on problems in hand composition does not guarantee high production on linotype operation, though the correlation coefficient is positive and significant.

Thinking capacity as shown in the *logical-selection and mixed-sentence tests* of the *mental-ability test* are a fairly good index of all-round hand-composition ability.

The arithmetic test of the mental-ability test is a good indication of the achievement in trade mathematics.

The best *thinker* is not consistently the fastest producer in the shop.

The small number of students included in the studies make conclusions inadvisable, though incomplete statistics computed from more recent students vary but little from the previous correlations.

Many of the studies here presented have been dropped

and other sources are being investigated because of low scores. Those of +.50 (coefficient of correlation) or higher are being checked with additional cases.

The Pearson formula shown herewith, was used for both the percentage and rank coefficients shown in the preceding tables.

Rank coefficients: $r = 2\cos\frac{1}{3}(1-R)-1 \quad R = 1-\frac{\Sigma D^2}{N^3-1}$

Percentage coefficients: $r = \frac{\Sigma xy}{N\sigma_x\sigma_y}$

School-Shop Management

*H. W. Paine**

THE success of any shop-teaching endeavor depends upon three major items: (1) proper equipment, (2) proper teaching, and (3) proper management. All of these factors are important, but observation of any shop activity will convince the most casual observer that the item of proper management determines to a very large extent not only the smooth running of the shop, but the teaching possibilities in that shop as well. If the roll is taken automatically and new jobs are assigned to students as soon as old ones are completed, if tool and check systems function properly, if lesson sheets and requisitions are readily available, and if record systems and progress charts are just and in evidence, the shop will, without question, be a place in which teaching will be easy and the so-called discipline problems (in most cases merely mismanagement problems) will be conspicuously absent. Careful analyses of most situations in which a shop is said to be "overequipped and undertaught," usually reveal situations of "*undermanagement*" in which well-equipped shops fail to function properly on account of lack of proper organization on the part of the instructors in charge. To make shop teaching easier and more efficient, some of the various devices that are being used in many of our most successful school shops, and which are described herewith, may be of value. In most instances they will be found to function equally well both in industrial-arts work with its multiple objectives and in the vocational shop with its specific objective of trade preparation.

The Roll

Perhaps the calling of the roll by the teacher during the first few meetings of the class is a justifiable "introductory" experience for both teacher and learners. It provides a means of learning proper pronunciation of names. Nevertheless, a more efficient attendance check method should be developed, because the instructor should realize that devoting five minutes of the time of the entire class to such a routine affair as the taking of attendance is an indefensible waste of time. In a trade class of 20 or an industrial-arts class of 30, such a procedure represents a daily "pupil-minute" investment of 100 and 150 minutes, respectively, which means 1 hour and 40 minutes or 2 hours and 30 minutes of misdirected and inane student "activity."

The roll-checking after a few sessions should be assigned to one pupil for a week or more at a time. By checking with group "foremen," if such exist, or by a prearranged assignment or seating location, he will certainly be able to secure this information for the instructor in much less than 1 hour and 40 minutes of student time. The roll thus secured should be rechecked by the teacher. This method leaves the instructor free to organize his shop activities in case the period is to be used without a preliminary "assembly." If the shop is fortunate enough to possess a time clock, the roll should be taken from the cards, checked by a pupil, and rechecked by the instructor. The above methods of handling attendance will be found much more efficient and effective than the conventional plan of calling the roll.

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Exhibits and Bulletins

One of the factors that determines whether a shop is interesting and attractive to students or dull and depressing, is the presence or absence of attractive displays, exhibits, and bulletin materials. Outside of their educational possibilities, good displays of commercial products and exhibits of the best "boy-produced" jobs are extremely valuable. Industries are usually not only willing but anxious to furnish exhibits that may be put up in vocational shops. Very little of this material can be objected to on the basis of "advertising." However, in the smaller communities or where intense rivalries are known to exist, instructors should call on more than one firm for materials of this nature. Tool companies, tire companies, auto manufacturers, machinery companies, accessory and supply manufacturers, both local and remote, are possible fields where this material may be secured. It is one of the shop instructor's most important managerial duties to see that such material is secured and put up.

Equally as valuable as displays and exhibits of a commercial nature are those that may be made in the school shop itself. Display boards built and equipped by members of the class always attract attention. One instructor of my acquaintance has a complete automobile engine disassembled and placed on such a board; others have machine products in various stages of completion. The possibilities of these home-made displays are almost limitless and the exhibition of the "best pieces of work" in a suitable setting is undoubtedly well worth while. Bulletin boards recording the latest developments in the trade being taught, or current events emphasizing some particular safety item will prove interesting. In the case of bulletin boards, a certain section of one board or, preferably, a single small board should be reserved for shop and school announcements. The toolroom assignment for the week, the assignment of special check-up or clean-up duties or any other matter of importance in shop management should appear on this one board and be looked for by members of the shop class. As soon as the pupils become "bulletin conscious," the instructor and class can be saved much unnecessary "announcement time."

Tool-Checking and Requisition Systems

A properly devised and functioning tool-checking and material-requisitioning system will be found of value in decreasing tool loss and breakage and in discouraging stealing, as well as teaching industrial procedure in handling tools and supplies. In most trades and in most shops a form of toolroom, brass-tool-check system will probably be found most satisfactory. This system will usually work best when all the tool checks are kept on a board in the toolroom and are transferred from an "in" board to the place from which the tool was taken. This obviates the chance that checks will be lost outside of school and presented for tools by some boy whose home training may not have been all that could be desired. A "Polly-Anna" attitude on the part of the instructor regarding the matter of stealing is undoubtedly wrong. A school shop or any other shop should not present opportunities that would *encourage* boys to take tools or supplies. Everything about the shop

should *discourage* it. Proper system will do infinitely more than anything else in this regard. Tool boards should have the outline of the tools painted on them and before the class is dismissed the tool checker should be called upon to report "all clear" to the instructor who should personally recheck this condition, sometimes before and always following the class dismissal. For certain classes of high-priced precision tools, the instructor should be personally responsible, passing them out from his private cabinet upon requisition only.

In some shops it will be found that certain tools will have to be continually at the disposal of students at their benches. Such tools should be organized in sets and invoiced out to the learners at the beginning of the semester and checked in again at its end. Some one student should be responsible for checking these tools on all benches at the end of each class period and any loss should be reported to the instructor at once. Obviously, his proper attitude upon discovering that a tool is missing is to attempt its recovery at once on the basis that someone has mistakenly put it in his pocket while using it or has mislaid it. Promptness in detecting the absence of tools will do much to prevent losses. Some schools secure a small deposit on certain tools at the beginning of the semester and refund the money at the end. This has its advantages and its disadvantages. Other instructors insist that lost tools must be replaced by either the entire class or by the individual.

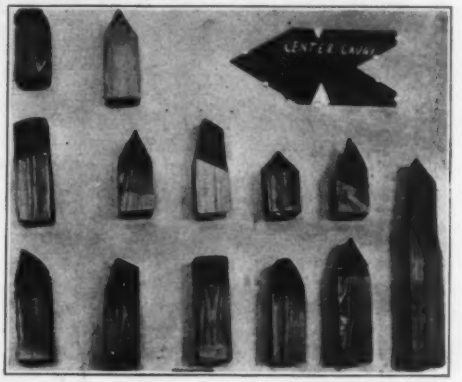
Requisitions and Records

Requisitions for supplies and materials used by the boys should be required on every job that goes through the shop. In case materials are sold to members of the class, each boy should possess a mimeographed price list of all such materials. Before starting a job the student should calculate its probable cost and submit these figures as part of his job plan. These figures should be rechecked by his group foreman, if the shop is organized on that basis, and later by the instructor. A careful account should be kept of all materials used and this account should be checked against the estimated cost. Devices such as these are the best possible methods of teaching the mathematics of the trade as well as preventing a boy from starting on an article too expensive for him to purchase.

In case the instructor handles money resulting from the sale of articles to members of the class, he should have a carefully organized accounting system. This system should contain a permanent-leaf record book in which each boy has a page upon which his purchases and payments are plainly and faithfully recorded. If the shop maintains a "revolving fund" or spends a small profit from the sale of its product, the instructor should keep a separate record of these transactions. Too much care cannot be exercised in handling school money, particularly money accruing from small sales to pupils.

Lesson Plans — Job Sheets

It is assumed that most of the actual instruction in the shop will be individual — any other procedure will be too wasteful of student time to be given consideration. Exception to this rule will be made when matters of general interest are to be considered, but as a rule the major part of our instruction, both manipulative and mental, will be carried on by means of job sheets, information sheets, individual demonstration, and conference. This means that our lesson plans will consist very largely of assignment notes as to what jobs different members of the class are to do each period. Blanks can be devised listing the students' names with spaces provided for "work to be done," "machine," etc. Such sheets will really constitute shop lesson plans and can be made as detailed as desired. Another excellent device used by many shop teachers is a book or card system of jobs to be done. Assignments of special work can be made from this source to supplement the regular course of study. In most trade shops it is desirable for the student to fill out a job plan sheet, planning his procedure and estimating costs before starting the job. The necessary instruction sheets covering any new points involved are next made available to him and any misunderstandings or doubtful points are cleared up by the instructor not only before work is started but also while it is being carried out. Since part of the student's job should be accounting for his time, blanks should be provided on his *job plan sheet* or this item should be cared for in some other way. One instructor provides a time accounting sheet with a space assigned to the question, "What three things did I learn today?" Perhaps such a device functions well in producing reflection on the day's work and making it part of the student's record.



DISPLAY BOARD SHOWING WOOD MODELS OF TOOL BITS, VOCATIONAL DEPARTMENT, HIGH SCHOOL, MANSFIELD, OHIO

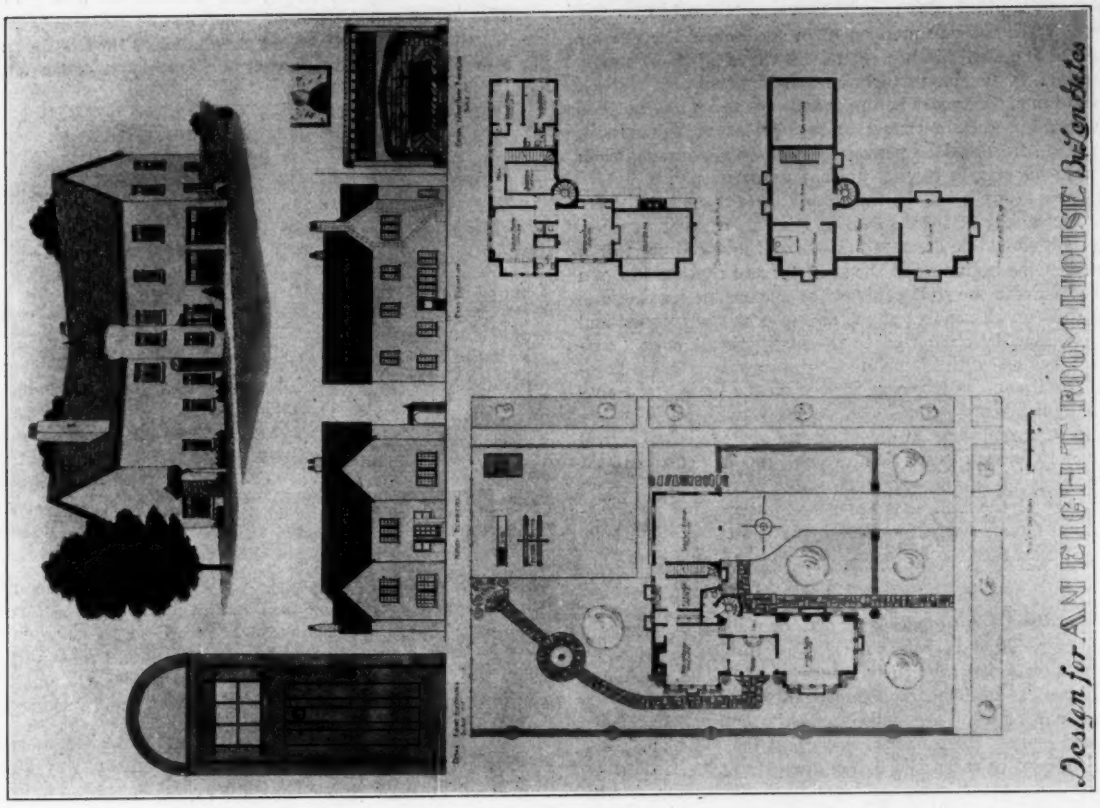
Records of Shopwork

Records of shop pupils' progress present problems much different from those encountered in academic education. These problems vary with the shop in which the record system functions. A record system for trade teaching should weigh the item of time, because acceptable trade speed must be attained before the student leaves the school. On the other hand, there is a question as to whether this item is of great importance to the industrial-arts group. However, items such as coöperation, industry, and initiative are of imortance to both groups Attempting to evaluate these last three items will involve judgments very largely subjective in character, and grades in these items, if given, probably should be specified as *satisfactory* or *unsatisfactory*. Many instructors rate their pupils on these items by giving a grade *separate* from the rating for *work* or *time* which latter factors can, of course, be made truly objective. Undoubtedly all these estimates of attainment benefit both the student and the instructor and are well worth recording. We should keep in mind, however, that from the learner's point of view a grade obtained objectively or one that can be backed up by relation of specific instances of excellence or failure are the only ones that will be considered just.

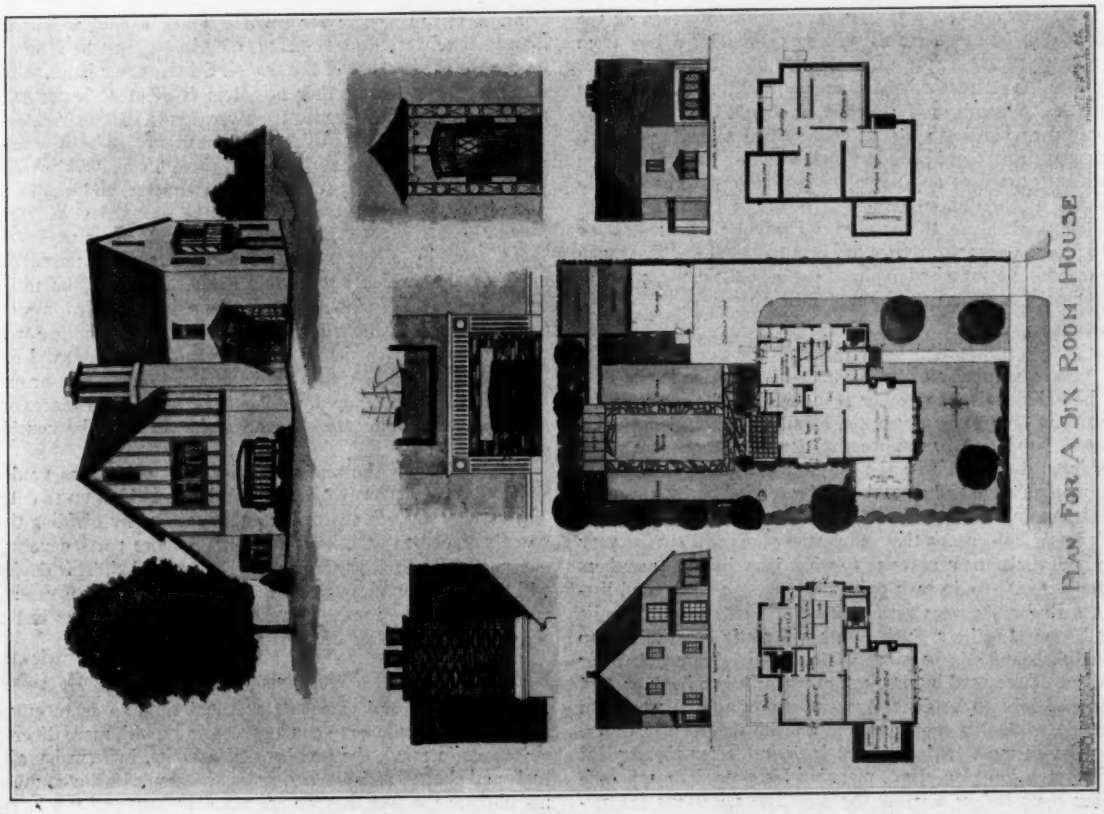
Progress charts showing accomplishment as well as grades should be conspicuously placed and religiously kept up to date. The number of such charts can be diminished by dividing the space assigned to each boy into four or more parts devoting one portion to each particular item to be graded. This device will simplify progress-chart maintenance to some extent. Above all, the boy must be made to feel that he has had a square deal regardless of the items graded.

Summary

In organizing and managing a school shop so as to effectively teach a trade or to conduct shopwork with more diverse objectives in mind, the problems of exhibits, bulletin boards, tools and checks, assignments, records, lesson plans, etc., must not obscure the fact that we are *teaching boys* and *not* keep-



ANOTHER PRIZE WINNER



A SPECIMEN THAT HELPED WIN THE TROPHY

ing records and looking after equipment. In the one case their industrial future will depend upon the effectiveness of our work, while in the other we are responsible for guidance, exploratory, and other values of education that will affect the individual's choice of a vocation. The instructor who becomes so involved in sheets, record keeping and other activities of a similar nature that he has no time to really teach or to remember his true reason for being, will defeat his own efforts. He should delegate to students as much of his accounting, attendance, and other detail work as can be effectively delegated. Items that are routine to him are educational to his students. In no other field of teaching does success so surely depend upon following the formula for success as given by an industrial leader — "organize, deputize, and supervise."

The Iowa State College Drawing Trophy

*R. M. Hammes**

THE Iowa State College drawing cup was first awarded in 1930. The contests have been an incentive to the drafting departments of the various schools throughout the state to improve the scope and content of their work.

During the Veishea week celebration at Ames the work done in industrial arts in the schools of Iowa is exhibited. At this time a group of capable and impartial judges rate the work of the various schools and individuals, and the awards of ribbons and of the trophy are made. Rules of the competition state that a school gaining the sweepstakes cup award three times shall have permanent possession. The drawing contest shows some keen competition and during the few years the competition has run the exhibits have improved greatly.

The drafting department of Abraham Lincoln High School, Council Bluffs, Iowa, entered the competition in 1929 and has won, each year, first place in the Urban Senior High School Division, first place for individual drawing in the same division and grand sweepstakes over all divisions both individual and as a school. The cup was awarded for the first time in 1930 so this school has won but two legs of the trophy.

Much credit is due the officials of the industrial-arts department of Iowa State College for developing these contests and for their interest in industrial-arts work in the schools of the state.

*Abraham Lincoln High School, Council Bluffs, Iowa.

THE VARIOUS PIECES MADE OF CURLY OR QUILTED MAPLE SHOWN IN THE PICTURE ABOVE WERE MADE BY WOODWORKING STUDENTS WORKING UNDER MR. HARRY T. MARTIN, INSTRUCTOR AT THE SENIOR HIGH SCHOOL, CHEHALIS, WASH. THE TREE FROM WHICH THE LUMBER FOR THIS PROJECT WAS CUT GREW IN SWAMP LAND NEAR CHEHALIS. THE BOYS OF THE SCHOOL, WITH THE PERMISSION OF THE CHEHALIS MILL COMPANY, OWNERS OF THE LAND, NOT ONLY LOCATED THE TREE USED FOR THE PROJECT, BUT ALSO HELPED WITH THE LOGGING, HAULING, AND SAWING. THE BOARDS WERE THEN HAULED TO THE SCHOOL SHOP AND STACKED IN A WELL-HEATED ROOM AT THE SCHOOL FOR FOUR MONTHS. IT WAS THEN WORKED UP INTO THE VARIOUS PIECES SHOWN

PROBLEMS & PROJECTS

PROBLEMS IN TRIANGULATION—CHART NO. I

C. H. Derby, Erie, Pennsylvania, and J. F. Faber, New York City

(See Supplement No. 244)

The problems shown on this chart are typical and are arranged according to difficulty in layout. The necessary construction and projection lines are shown and the pattern developments should offer no difficulty after a preliminary study of this branch of sheet-metal pattern drafting.

A GLIDER MADE IN ONE MINUTE

Terence Vincent, U. S. Director of Miniature Aircraft Fliers, Kansas City, Missouri

The glider illustrated and described herewith is very popular with youngsters who are anxious to see results quickly. The tools required to make it are a sharp knife, a hack-saw blade, some sandpaper, and a pair of pliers.

To make this glider in one minute, proceed as follows:

a) Cut base 2 out of a piece of balsa measuring ¼ by 1 by 6 in.

b) With the hack-saw blade, saw in the tail slots precisely as shown, the elevator slot being parallel to the slant cut of the base, and the rudder being perfectly parallel to the sides of the base. Each of these slots is to be ¾ in. long.

c) Insert a long rubber band into a staple and then push this staple, shown as piece No. 6 in the illustration, into the nose of the base. It is for this that the pliers is to be used, and the staple should be pushed in with a slow, strong pressure so that the job is done accurately. The staple, besides holding the rubber band, acts as a nose weight to the glider.

d) Taper the tips of the wing, elevator, and rudder as shown in the illustration. It is not absolutely necessary that this be done, but it adds to the appearance of the finished glider.

e) Attach the wing to the base with a rubber band as shown in the illustration. Be sure that the rubber is crossed on top, as this aids in holding the wing level.

f) Insert the elevator, piece No. 3, and the rudder, piece No. 4.

g) The glider is now ready for its initial flight. Grasp the base of the glider firmly under the wing and toss it vigorously forward — not upward. Note the wing's placement. If level flight is desired, move the wing gently backward toward the tail. Right or left flights may be had by adjusting the wing or elevator, or both, to the right or left, or by holding the glider in a slanting position while launching it.

The glider may also be vigorously tossed forward by gripping the base under the wing and shooting it forward by means of the rubber band that has been attached under the staple.

After the glider performs satisfactorily, the tail parts 3 and 4 may be glued into place. Some, however, prefer not to do this so the entire glider may be taken apart for carrying.

This little glider, which can actually be made in a minute, was designed especially to catch and hold the beginner's interest. After that interest is once attained, more pretentious aircraft may be undertaken.

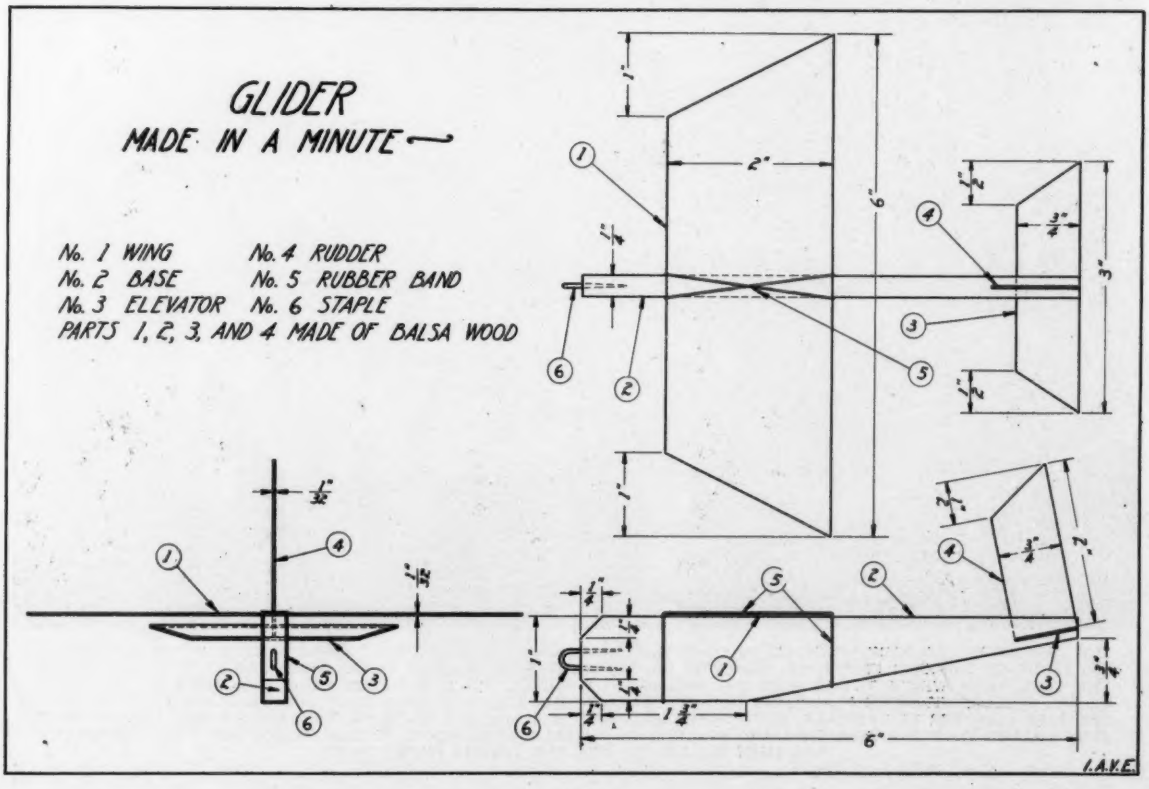


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CHART No 1 OF TYPICAL PROBLEMS IN TRIANGULATION - By C. H. DERBY & J. F. FABER

SQUARE TO ROUND

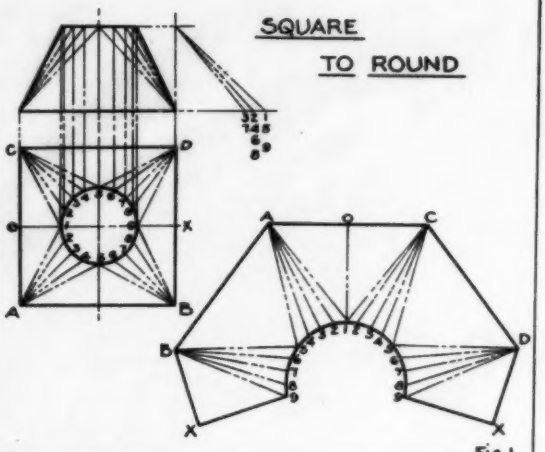

Fig. 1

TRANSITIONAL OFFSET

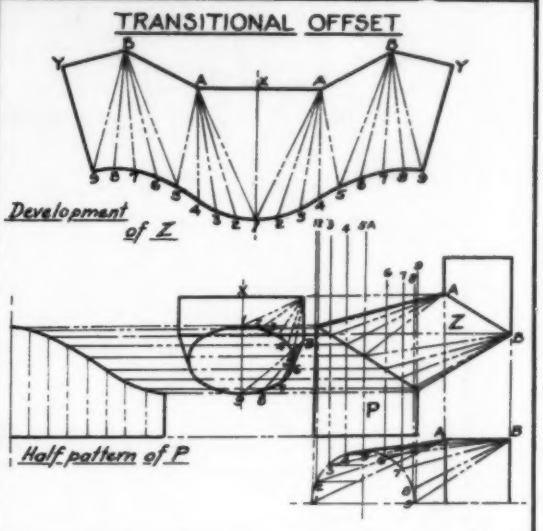

Fig. 4

ROOF COLLAR

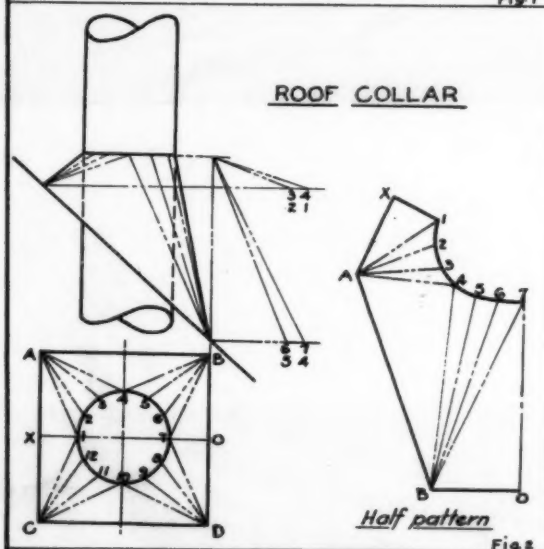

Fig. 2

TWISTED RECTANGULAR ELBOW

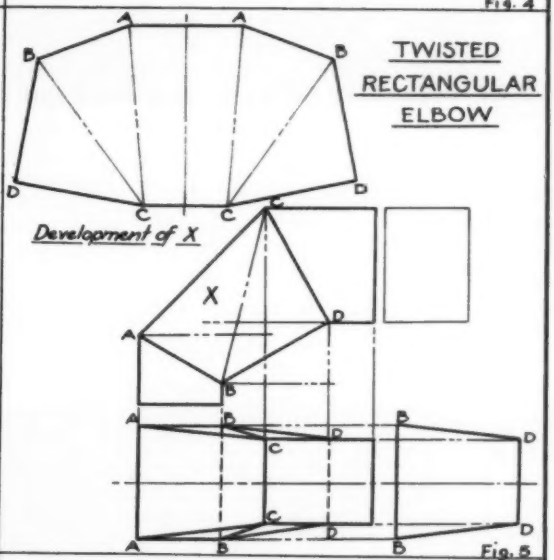

Fig. 5

OBLIQUE TAPER TO FIT CORNER

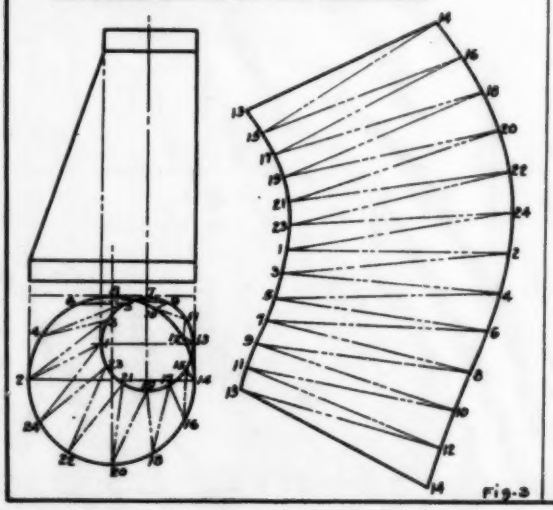

Fig. 3

STRAIGHT SIDE TAPER ELBOW

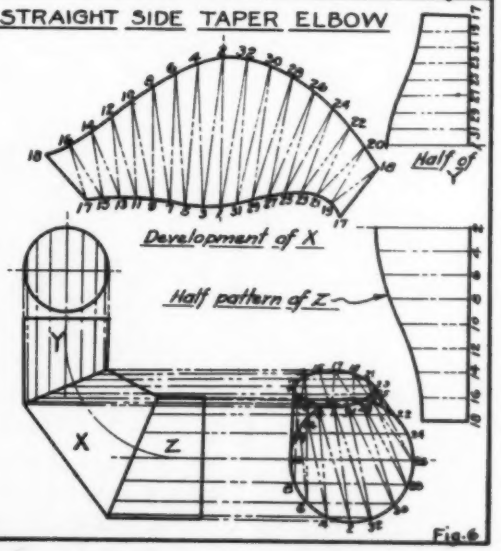

Fig. 6

Submitted by C. H. Derby, Erie, Pa., and J. F. Faber, New York City

Described Elsewhere in This Issue

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THE STRUCTURE AND SEASONING OF EXOGENOUS WOODS

(1) BARK
EPIDERMIS – Broken cork
CORTEX – Cork
BAST – Fibrous coat
CAMBIUM – Tissue of growing cells

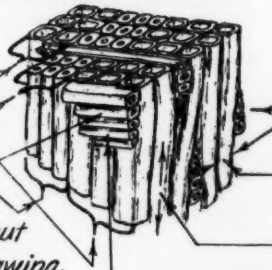
(2) HEARTWOOD – Matured wood, constituting the major part of the trunks of old trees.

(3) SAPWOOD – Immature wood

(4) PITH or HEART

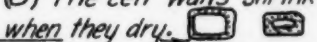
(5) GROWTH RINGS (Annual Rings)
Each ring has two layers:
Spring wood
Summer wood

(6) MEDULLARY (PITH) RAYS
These are relatively inconspicuous unless they are cut longitudinally as in quarter sawing.



(7) Diagram showing the cellular structure highly magnified.

(8) The cell walls shrink when they dry.



(9) Cells don't shrink perceptibly in length.

(10) Since pith-ray cells run radially, they resist the radial shrinkage of wood.

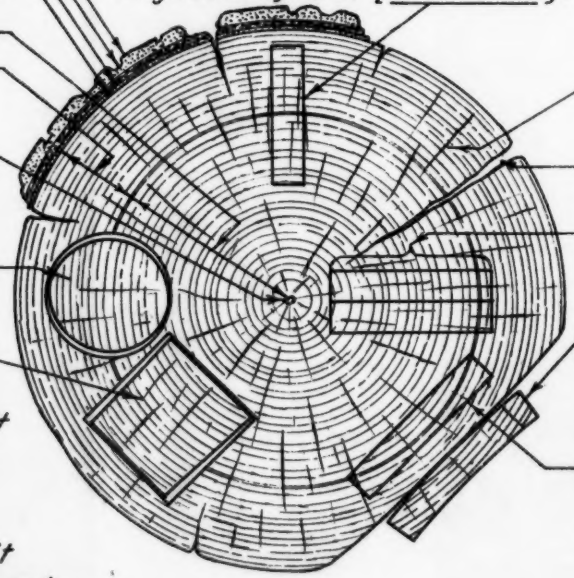
(11) Since wood does not shrink as much radially as it does circumferentially, logs split open when seasoning.

(12) Also, quarter-sawed boards shrink less than plane-sawed boards.

(13) Since wood draws more along the annual rings when seasoning, plane-sawed boards tend to warp thus:

(14) Since sapwood may shrink less or more than heartwood a board consisting of both heart- and sapwood is especially subject to warpage.

(14-A) In kiln drying sapwood loses from 40 to 65 % in weight and heartwood loses from 16 to 60 %.



(15) If a true cylinder were cut from green wood, it would become oblate when seasoned.

(16) Showing the result of seasoning a square piece of wood:

(17) Evaporation decreases the weight and size of wood, but it increases its strength.

(18) Warpage is caused by uneven shrinkage.

(19) The ends of wood cells admit air readily, so the end of the wood seasons more quickly, causing frequent end splits.

(20) Woods shrink from two per cent to ten per cent while seasoning.

(21) Careful air drying requires from one to five years and kiln drying from three days to three weeks. Air-dried wood contains about 15% water & kiln dried about one half as much.

(22) Hardwoods (from broad-leaved i.e. deciduous trees) are harder to season and generally shrink and warp more than softwoods (from evergreen i.e. coniferous trees).

H.H. Robinson, Augusta, Kans.

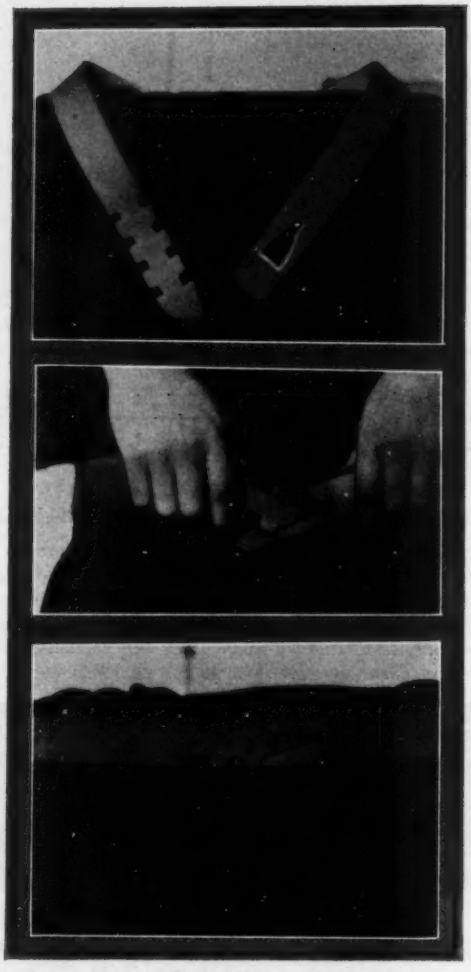
Submitted by H. H. Robinson, Augusta, Kansas

BUCKLELESS BELT

Henry H. Batchelder, Point Loma Junior-Senior High School, San Diego, California

As a novel, yet comparatively easy leather project, this buckleless, stitchless belt has an appeal all its own.

The width and length vary in accord with the taste of the maker, and the use to which the belt is to be put. For strength and appearance, however, the proportions should remain more or less constant.



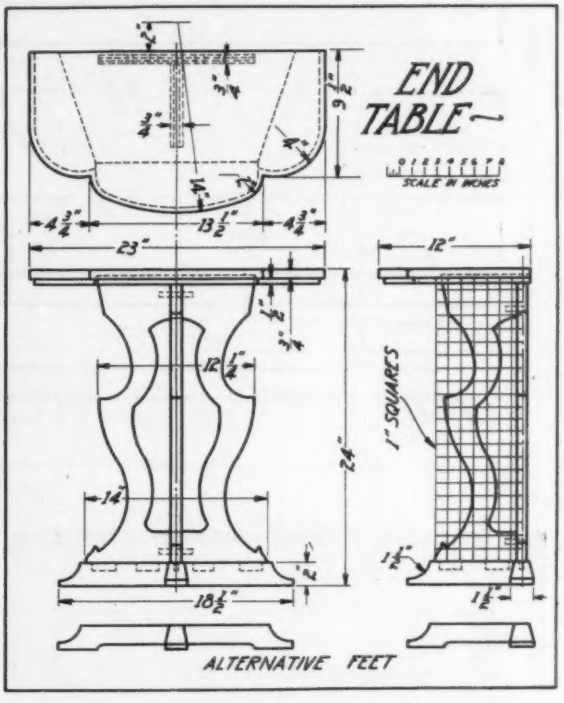
TOP: THE BELT — CENTER: THE START — BOTTOM: THE FINISH

The choice of leather and layout depends upon the student. The knifework is more or less delicate, and requires care. When cut, the tooling, patterning, and dyeing also follow individual desires. From the illustrations it may be seen that the adjustments are as "close" and "fine" as the old-style buckle belt.

END TABLE

J. B. Duncan, Winnipeg, Manitoba, Canada

The end table shown herewith may be built of walnut or mahogany. The legs are made of three pieces doweled together, and tenoned to the top and feet. The project appears best when stained, although a natural finish may be used.

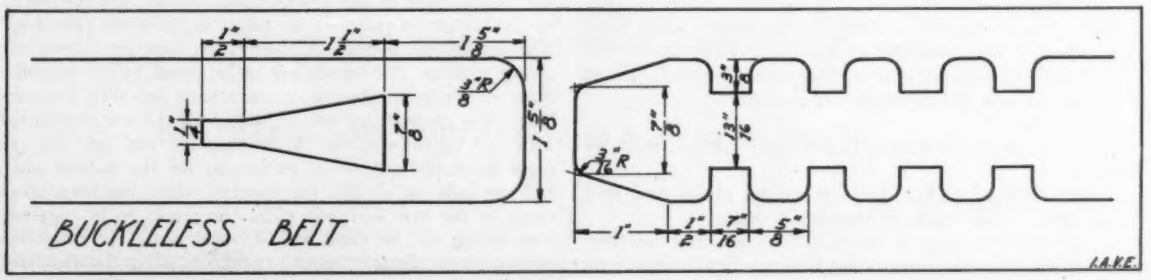


A BENDING FORK

F. E. Tustison and Ray F. Kranzusch, The Stout Institute, Menomonie, Wisconsin

A bending fork is a convenient tool for the metal shop. The jaws of the vise or the monkey wrench are sometimes used to advantage for bending stock, but the fork described is especially adapted for forming scrolls of small radii. It can be made of either round or hexagon steel, but the hexagonal steel can be more easily held in the vise. Tool steel makes the more permanent fork, but mild steel will do as well. Figure 1 shows a fork and some typical scrolls. For use, the fork is clamped in the vise in any convenient position. The stock is then bent in the slot of the fork. Figure 2 shows the fork in use for shaping the leg of a floor lamp.

The illustrated scrolls and floor-lamp leg were all shaped cold. The scroll stock is No. 12 by ⅝ in., and the leg stock ¼ by ¾ in. When scrolls of small radii are to be formed out of heavy stock, the metal may be heated in an ordinary soldering furnace. The scrolls can then be bent in the fork.



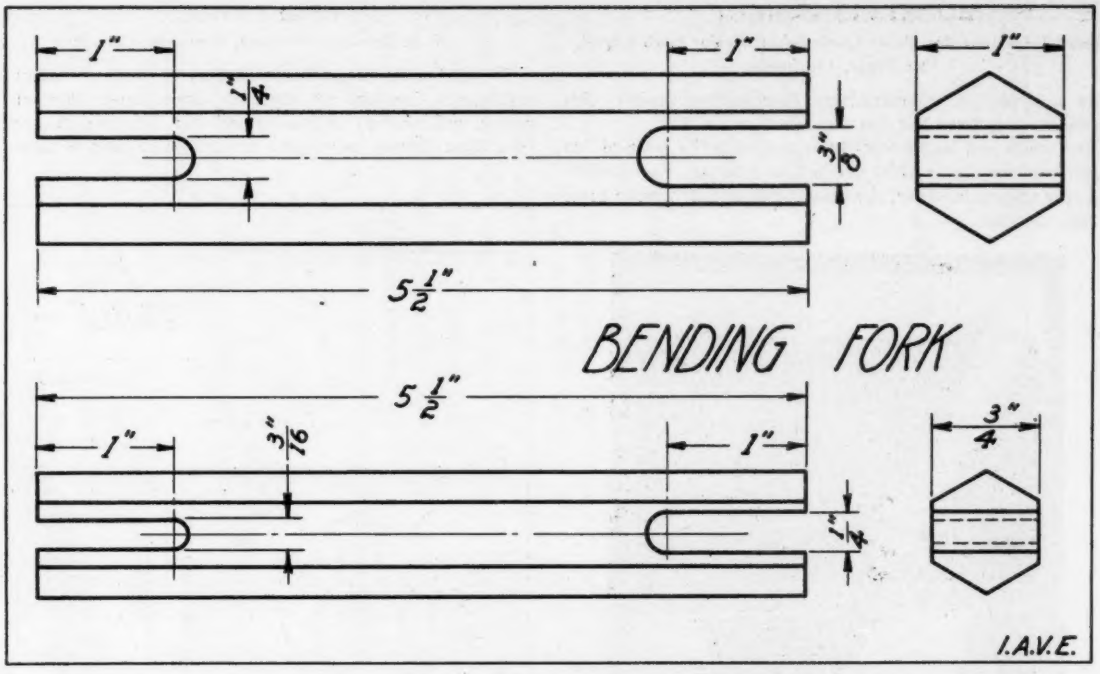


FIG. 3. BENDING-FORK DETAILS

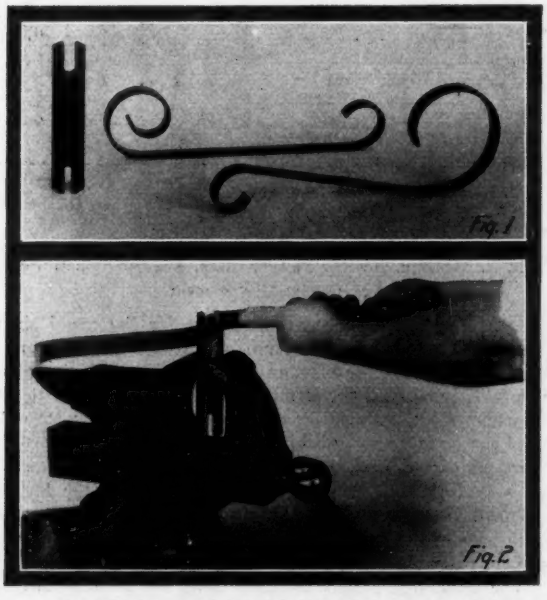


FIG. 1. A BENDING FORK AND SEVERAL TYPICAL SCROLLS
FIG. 2. BENDING A LEG FOR A FLOOR LAMP

Figure 3 shows a dimension drawing of two useful forks. Larger or smaller stock may be used to make similar forks for special purposes.

Tools: Rule; square; scriber; center punch; vise; hand or bench drill; hack saw; file.

Material: Hexagonal mild or tool steel, 1 in., ¾ in. or other sizes to suit. Round stock will also do.

Procedure:

1. Cut the stock to length. Lay off and saw the stock to length.

2. Drill holes for slots. Lay off, center punch and drill holes equal to the width of the slot desired.

3. Saw the slots. Lay off and saw the slots. Saw carefully and smooth slot will result. Remove any burred edges with the file.

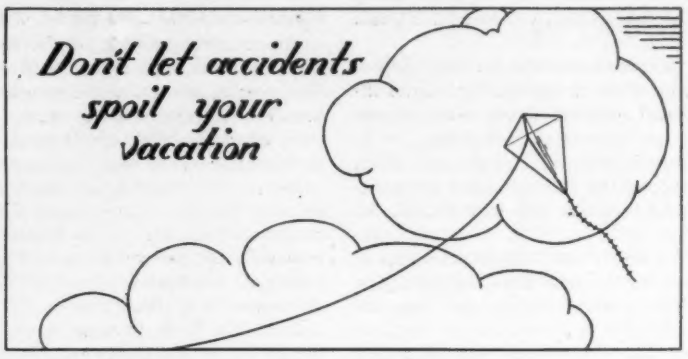
A BUILT-UP BREAD BOARD

U. G. Whiffen, State Teachers College, Maryville, Missouri

The built-up bread board is a very popular project with the boys in woodwork. It has the fascination that all built-up woodwork has for the student. It is not difficult to make and can be made in any shop that has a band saw or a jig saw. It not only gives training in accuracy and neatness, but also affords excellent practice in making glue joints.

BUILT-UP BREAD BOARDS

The boards must be made in pairs, using five pieces of hard maple and five pieces of black walnut ¾ by 2¼ by 18 in. finished size, to make the two boards. The pieces are glued together alternating walnut and maple, using three walnut and two maple for one board and two walnut and three maple for the other. This gives one board with walnut on the outside and the other with maple. After the boards have been glued up and the glue is dried, all surplus glue must be scraped off and one board placed on top of the other, with walnut strip exactly over the maple strip below it. The boards may be fastened together with either screws or nails placed in the corners. Care must be taken in fastening the pieces together so as to prevent them from slipping during the sawing process. The boards are to be sawed to the propeller shape shown in the illustration, on a band saw with a narrow blade. The pieces must not be backed off the saw, but sawed with one continuous cut. After they are cut out, the top propeller-shaped pieces are exchanged for the bottom ones, and the ends cut so that the material which has been taken away by the saw kerf will allow the pieces to fit together. This fitting can be done with a wood rasp. The propeller-shaped pieces are next glued in position. After the glue sets, the board is scraped and cut to shape.



Slogan: No Accident This Vacation

MORE VACATION CAUTIONS

1. Stop, look, and listen before crossing a road.
2. Kite flying, where the string may touch electric wires, is dangerous.
3. Know how to put out your camp fire.
4. Drink only pure water.
5. Be careful of what you eat.
6. Hatchets and knives are dangerous.
7. Fishhooks also catch careless humans.
8. Know how to treat burns—this includes sunburn.
9. Know and avoid poisonous plants and berries.
10. Make July Fourth safe as well as enjoyable.

Courtesy of National Safety Council, Chicago, Illinois.

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AMONG INDUSTRIAL-ARTS TEACHERS

¶ Mr. Ralph G. Waring, author of *Principles of Mill and Paint-Shop Practice*, will teach a course of wood and metal finishing at the Oswego Normal School, Oswego, N. Y., this summer.

¶ Mr. Harry Sutter, an instructor in the Technical School at Fresno, Calif., died at his home in April, after a brief illness. He possessed that real love for boys which induces students to come to their teacher with their problems.

¶ Mr. W. Harry King, of Mitchell, S. Dak., has taken over his duties as a member of the Federal Board for Vocational Education. Mr. King succeeds the late Mr. C. M. Henry.

¶ Mr. J. H. McCloskey, supervisor of manual training at Lakewood, Ohio, will serve on the summer-school faculty of the Department of Industrial Education at the Colorado Teachers College, Greeley, Colorado.

¶ Mr. Ted Collins has been reëlected as manual-training teacher at Dumont, Pa.

¶ Mr. George I. Martin, instructor in vocational education in the Sylvester High School, Worth county, Ga., was given the loving cup which is annually awarded as the Southern Master Teacher's award, by the Georgia Vocational Education Association. Accompanying the cup was an engraved certificate from the Master Farmers of America, who donate the cup.

IAVE ASSOCIATION AND CONVENTION NEWS

BOSTON VOCATIONAL EDUCATION SOCIETY MEETS

The Vocational Education Society of Boston held its regular monthly meeting on Saturday, April 16, at the East Boston Airport.

After the luncheon, the members listened to an address on "The Progress and Possibilities of Aviation," by Mr. Curley of the Curtiss-Wright Company. Mr. Curley brought out that the manufacture of airplanes has fallen off due to the small demand for private airplanes, while the demand for student training has received a setback due to business conditions. He showed that aërial photography is being rapidly developed and that contractors and city planners are recognizing the value of such pictures. Training and vocational possibilities for both pilots and mechanics were outlined by Mr. Curley for the benefit of those interested in the vocational guidance side of the subject.

Following the talk, a number of special trips were arranged for those who had not previously enjoyed an airplane flight. — *Louis A. Van Ham.*

THE SCHOOL CRAFTS CLUB MEETING

The School Crafts Club of New York City held an interesting meeting in April. One of the features of the meeting was the presence of one of the oldest members, Mr. Frederick C. Arnold, who gave a talk on "The Shop Teacher, His Work, His Objectives, His Place in Education, and His Future." Mr. Arnold stressed the need for the shop teacher to be a real instructor, able to participate in the general organization, and to make himself felt. He should never stop being a student, but should always reach out for growth, power, and culture. In the future, the shopmen must work and speak for themselves and must be able to justify their position and organization, since no machine or school is any stronger than its parts. Mr. Leo Blumenfield, of New York City, closed the meeting with a brief talk on "Vocational Guidance."

It was announced that the annual May banquet would be held in Newark. — *Arnold M. Hess.*

PEORIA INDUSTRIAL-EDUCATION CLUB

The monthly meeting of the Peoria Industrial-Education Club was held April 18, at the West Bluff Christian Church. The meeting was called the summer-school meeting and was intended to create a desire among the members to continue their education. The members of the club recounted what their schools had to offer the summer-school students of 1932.

Dean A. F. Siepert, of Bradley Institute, described the plans of the Bradley institution for the twenty-ninth annual summer school. Mr. C. M. Hewitt, of the same institution, recounted the history of Iowa State College and of its department of industrial education. Mr. F. E. Dace, of Bradley, gave some facts concerning the University of Illinois summer session. Mr. E. K. Frye, of Bradley, told about the work at the University of Chicago and described some of the new methods in education which are being attempted there. Mr. H. E. Clark told some interesting things about camp life while attending Wisconsin University. Mr. J. W. Dean, of Peoria High School, gave information about the University of Iowa and what it had to offer a student who is working for a master's degree. Mr. Earl English, of Peoria High School, represented Purdue University.

The last meeting of the school year, which will be held May 9, at Pekin, will feature an address by Mr. Floyd Lee, of Pekin, who will speak on "Bullfights in Spain." A report also will be given on the Western Arts Meeting held at Saint Louis. — *F. L. Barloga.*

MINNESOTA INDUSTRIAL TEACHERS MEET IN MINNEAPOLIS

The industrial teachers and supervisors of Minnesota held their spring meeting during schoolmen's week at the University of Minnesota, Minneapolis, with Mr. W. B. Morgan acting as chairman. The number in attendance exceeded all previous records.

Mr. H. T. Widdowson, state supervisor of industrial education, opened the meeting with a talk on "The Rating of Shop Teachers," explaining who are the best shop teachers and what makes them good teachers. Mr. Homer J. Smith, of the University, followed with a paper on "The Rating of Shop Students," showing the need for efficient grading of work and its value as an important factor in good teaching.

A selection of good shop textbooks was on display for the benefit of those in attendance.

Officers elected for the next year are the following: Mr. Walter F. Anderson, Boys' Vocational School, Minneapolis, president; and Victor A. Johnson, Wayzata, Minnesota, secretary. — *W. B. Morgan.*

ELEVENTH ANNUAL CONFERENCE ON PRINTING EDUCATION

A feature of the Eleventh Annual Conference on Printing Education, to be held at Harding Hall, Government Printing Office, Washington, D. C., June 27–29, will be an evening meeting at the Library of Congress. At that time, Mr. Frederick W. Ashley, chief assistant librarian, will speak in the Coolidge Auditorium on "The Vollbehr Collection of the Incunabula." The books will be exhibited in the foyer of the auditorium, and there will be a special display showing the history and development of printing, for the benefit of teachers of this art.

Among those who will discuss problems and progress of printing are Mr. William Pfaff, president of the United Typothetae of America, New Orleans, La.; Mr. John J. Deviny, secretary of the United Typothetae of America, Washington; Mr. E. B. Passano, Baltimore, Md.; Mr. W. J. Eynon, Washington; Mr. Harry Hillman, Washington; Mr. E. P. Trotter,

New York City; Mr. W. E. Barr, Rochester, N. Y.; Mr. W. D. Hall, Washington; Mr. Gerald Walsh, Washington.

Both the Typothetae of Washington and the Washington Club of Printing House Craftsmen are sponsoring the conference. An impressive array of speakers connected with the government will appear on the program, including Congressman Clyde Kelley; George H. Carter, public printer; Dr. J. C. Wright, director of the Federal Board for Vocational Education; Mr. Frederick W. Ashley, chief assistant librarian; Mr. Maris M. Proffitt, consultant and specialist in vocational guidance and industrial education; Capt. E. S. Moorhead of the Government Printing Office; and Mr. Clark R. Long, assistant director of the Bureau of Printing and Engraving.

The addresses and discussions on the recent developments in printing education will be handled by such well-known educators as Dr. William E. Grady, New York City; Dr. Stephen E. Kramer, Washington, D. C.; Dr. J. D. Blackwell, president of the National Association of State Directors of Vocational Education; Prof. David Gustafson, Carnegie Institute of Technology, Pittsburgh, Pa.; Mr. Otto W. Fuhrmann, director of the division of graphic arts, New York University; Mr. J. Elmer Zearfoss, director of manual training, Washington, D. C.; Mr. John E. Fintz, assistant supervisor of manual arts, Cleveland, Ohio; Mr. Thomas E. Dunwoody, director of Technical Trade School, Pressmen's Home, Tenn.; Mr. R. W. Polk, supervisor of printing, Detroit, Mich.; Mr. Ira D. Pilliard, director of printing, Milwaukee Vocational School; and Mr. Merritt W. Haynes, American Type Founders Company, Jersey City, N. J.

A large number of teachers of printing will appear on the program, including such well-known men as Mr. R. A. Loomis, Jersey City, N. J.; Mr. B. F. Tomlinson, Central Printing Trades School, New York City; Mr. Pearl E. Oldt, Central High School, Grand Rapids, Mich.; Mr. C. A. Lyle, McKinley High School, Canton, Ohio; and Mr. Frank Rhodes, Montreal Technical School, Montreal, Canada. — *Frank K. Phillips.*

INDIANA INDUSTRIAL EDUCATION ASSOCIATION MEETING

The industrial-arts teachers of Indiana, after a preliminary meeting held at the Indiana State Teachers Association meeting last October, decided that it was time to form a state organization so that the individual teacher could be aided to do more effective work. At this preliminary meeting, Mr. Earl L. Bedell, assistant director of vocational education in Detroit, explained the Michigan plan of organization.

The Indiana industrial-arts teachers then divided their state into ten districts arranged in such a manner that the boundaries of each district would embrace a large city or a teacher-training institution or college. Chairmen for these districts were appointed, with directions to hold district meetings which would lead up to an organization meeting to be held at Kokomo in April. Much interest was aroused which culminated in an attendance of 400 teachers at the convention held on April 15 and 16, at Kokomo, Ind.

Constitutions and by-laws were adopted and the following officers were elected to direct and guide the Indiana Industrial Education Association for the coming year: Mr. G. F. Weber, of South Bend, president, and Mr. John Dillon, Bloomington, as vice-president. The office of secretary-treasurer will be filled by the executive committee which will be composed of a representative from each district with three appointed at large, the president and vice-president acting *ex officio.*

A most excellent program was presented at Kokomo, and many schools throughout the state exhibited work from their industrial-arts departments, the local exhibit from the Kokomo schools being very commendable.

It is planned to have a department of research with a representative in each district and a coördinator over the whole to make surveys and formulate help which will be of assistance to the teachers in the industrial-arts departments throughout the state. — *Harry E. Wood.*

MICHIGAN INDUSTRIAL EDUCATION SOCIETY MEETS AT FLINT

The 1932 convention of the Michigan Industrial Education Society, held April 14, at Flint, was the largest and certainly one of the most successful since the organization of the society four years ago.

The keynote of the convention centered in the fact that industrial-arts education is intended to do more than train for skill. A number of the speakers emphasized this point and urged the teachers to determine their real objectives, and to recognize the tremendous breadth of influence of their subject.

The ship was well manned and the members of the association were appreciative of the opportunity to see and handle the latest in equipment and literature.

The speakers treated their subjects in a manner that was both inspirational and thought-provoking. Mr. Samuel Morgan, city commissioner of Flint, emphasized that it is the function of the school to provide academic and cultural training and that the necessary training for industrial tasks are best provided by industry itself. He expressed the opinion that one of the reasons why young people are disappointed when they leave school to enter industry is the gap between school and the workaday field. This he attributed to the fact that industry changes while the schools remain more or less static. He expressed the belief that it is necessary to operate the industrial shops as a continuation of the school, and that this is best accomplished by apprenticeship or coöperative courses.

At the banquet on Friday evening, Dr. Fisher, of Ann Arbor, gave an interesting talk on "Builders of Men," in which he declared that teachers, if they are to be builders of men, must be able to build their own characters. Dr. C. A. Prosser, who gave a talk at the luncheon meeting on Saturday, pictured the machine age as one in which the low-grade workers are driven out of industry and in which only the expert has a permanent place. He went on to say that he is not opposing labor-saving machines, but pointed out that, in taking advantage of the benefits derived from them, we must also take the evils which accompany them. Dr. Prosser said that he believed that in the future, the question of skill is of less importance than the ability to think and use judgment, and that the main function of the school today is to develop habits of thinking, of judgment, and of resourcefulness.

Dr. Arthur B. Mays, of the University of Illinois, said that, in most cases, school people spend too much time on machines, equipment, and other things necessary for effective teaching. He pointed out that, while these things are important, the pupils should be the main concern and not the machinery. He stated that a large number of students cannot profit from academic instruction, but that they are able to learn much about attitudes and right habits of conduct in the school shops. It is sometimes necessary, said Dr. Mays, that the teacher of industrial arts deviate from the field of industrial arts in order to emphasize these external things. He concluded by urging teachers not to minimize their efforts in teaching their subject, but to increase their efforts to develop proper habits in the students with whom they come in contact. — *Thomas Diamond.*

THE EASTERN ARTS CONVENTION

The theme of the Eastern Arts Association Convention held at the Hotel Pennsylvania in New York City, April 19–22, was "The Arts, a Necessity in Modern Life." Although the attendance was somewhat smaller this year, the membership is still holding up under the strain of the depression.

Prof. Roy Mitchell, dramatic critic and professor of dramatic arts of the College of Fine Arts, New York University,

started the program with an illustrated and ably presented lecture on "Theater Arts."

The sectional meetings on Wednesday were fairly well attended. The industrial-arts section, under the chairmanship of Mr. George F. Hatch, assistant director manual arts, Boston public schools, unfortunately was very poorly attended.

Other speakers on the various programs on Wednesday, Thursday, and Friday were: Mr. Harry L. Gage, vice-president of B. Altman and Company, New York City; Mr. Maris M. Proffitt, educational consultant and specialist in guidance and industrial education, Washington, D. C.; Prof. Charles R. Richards, executive vice-president, New York Museum of Science and Industry; Capt. Willis C. Brown, of the junior Aviation League of New England, and instructor in the public schools of Boston; and Earnest Elmo Calkins, of the Calkins & Holden Advertising Co., New York City.

Quite a number of the commercial exhibitors took advantage of this opportunity to present their wares for the inspection of the teachers who attended. As usual The Ship Dance was one of the high spots in the convention proceedings. — *E. W. Manzer.*

NEWS — NOTES

Wisconsin Vocational Directors Meet at Madison

Directors and coördinators of vocational schools in Wisconsin held their annual meeting on April 1, at Madison.

Complete Survey of Baking Industry in Wisconsin

A study of the baking industry in the Fox River Valley and Lake Shore cities of Wisconsin has been completed by a committee of vocational school officials, working under the direction of Mr. Herb. Heilig, of Appleton. The survey offers data on 43 baking establishments employing 316 persons.

Foundry Class at Kaukauna, Wisconsin

A foundry class has been established in the vocational school at Kaukauna, with considerable success. The course covers both the theory and practice of molding and pouring iron. Six hours of each day are spent in the local foundry plant, and the remainder of the day is given to academic instruction in the vocational school.

Kite Construction at Oklahoma City, Oklahoma

Instruction of kitecraft and kite flying is being offered in the Webster Junior High School, Oklahoma City, under the direction of Mr. Alonzo Norwood, the instructor.

Electrical Course at Green Bay, Wis.

Plans have been made for the inauguration of an electrical course at the vocational school in Green Bay to give training in electrical theory and its applications. The course is divided into four parts, each requiring 11 hours of classwork and 16 hours of homework, making the entire course 108 hours of study and recitation.

Propose New Building-Trades Center in New York City

Mr. W. E. Grady, associate superintendent of schools of New York City, has offered the coöperation of the educational authorities in meeting the need of the New York Building Congress for a building-trades center. Mr. Grady pointed out that progress along similar lines has been made in the textile, needle, and printing trades, which had concentrated their skill and energy in making provision for training facilities.

NEW PUBLICATIONS

Working Drawings of Machinery

By Walter H. James, Malcolm C. Mackenzie, and Alvin Sloane. Cloth, 147 pages, 6¼ by 9¼, illustrated. Price, $2. Published by John Wiley & Sons, Inc., New York City.

This is a revision of a text that was first published in 1913. It has been brought up to date so as to conform to present-day drafting-room procedure and standards.

The Dixon Class Card

By John Dixon. Twelve cards, 6¼ by 10. Price, 40 cents. Published by The Bruce Publishing Company, Milwaukee, Wis.

This class card, which serves as a class roll as well as a progress chart for individual and class activities, was devised so that it will fit the requirements of the elementary school, junior high, senior high, technical school, part-time and full-time vocational school, and normal school. Recording and averaging on this card have been much simplified and there is ample space for all necessary records. The cards are adapted to either letter or per-cent methods of recording.

Earning and Spending the Family Income

By Mata Roman Friend. Cloth, 416 pages, 5½ by 7½, illustrated. Price, $2. Published by D. Appleton and Company, New York City.

This little volume contains a wealth of information on this important phase of man's social life. The subject matter has been divided into eight separate units which are discussed under the following headings: Home — the basic institution in our social organization; American standards of living; the financial organization of the household; consumption; the purchase of food; the purchase of clothing; the purchase of shelter, and expenditure for advancement.

Elementary Platen Presswork

By Ralph W. Polk. Cloth, 148 pages, 5½ by 8, illustrated. Price, $1.50. Published by The Manual Arts Press, Peoria, Ill.

This little volume contains a great deal of information about the simple press operations. It presents the development of the press from Gutenberg's invention down to the present time, and describes the pressman's work from the time the job is put on the press, until it is ready for the customer.

Living Geography. Books I and II

By Ellsworth Huntington, C. Beverley Benson, and Frank M. McMurry. Cloth illustrated. Book I, 346 pages, 28 map plates, price, $1.20. Book II, 506 pages, 38 map plates, price, $1.60. Published by The Macmillan Company, New York City.

Each of these books is complete; both include a study of the whole world. Book I, *How Countries Differ,* approaches the study historically, laying emphasis upon a study of village and rural life. In Book II, *Why Countries Differ,* the approach is through causal geography, emphasizing urban and industrial life.

The unit plan of instruction is employed throughout. Questions, tests, and exercises, and outside readings are suggested for the separate units. The books are richly illustrated.

The work also is available in a four-volume edition for those who prefer a separate book for each year.

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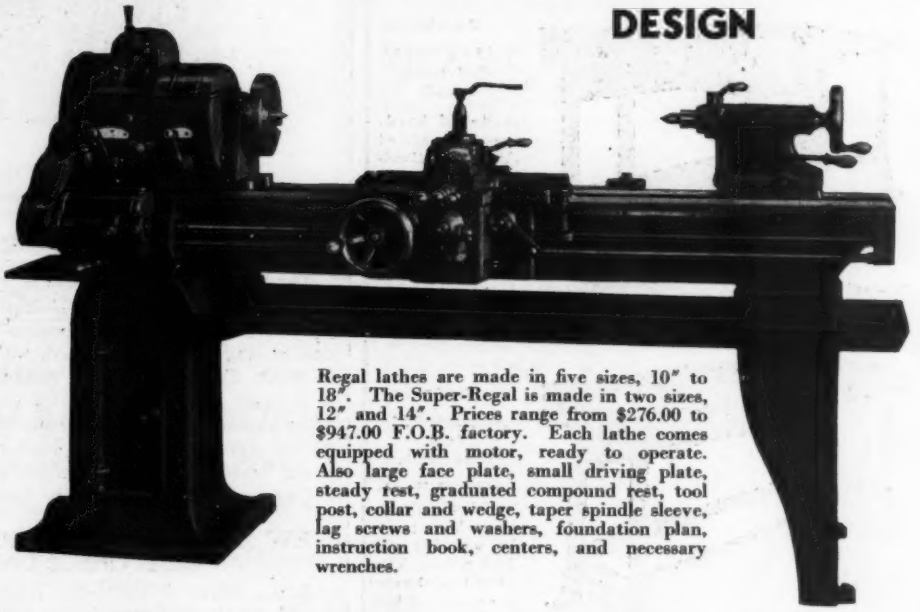

Regal lathes are made in five sizes, 10″ to 18″. The Super-Regal is made in two sizes, 12″ and 14″. Prices range from $276.00 to $947.00 F.O.B. factory. Each lathe comes equipped with motor, ready to operate. Also large face plate, small driving plate, steady rest, graduated compound rest, tool post, collar and wedge, taper spindle sleeve, lag screws and washers, foundation plan, instruction book, centers, and necessary wrenches.

This 70-page book is an "Encyclopedia of Lathe Operation." Sells for 25 cents, but sent free to any instructor when requested on the school letterhead.

THE lathe that makes it easier to teach and easier to learn. The Super-Regal graduate will reflect credit upon his school and his instructor.

The Super Regal Lathe, built to the LeBlond standard of accuracy and modern design, has been made as safe, simple, sure and efficient as engineering ingenuity can make it —an excellence of mechanical construction never before offered in a school lathe.

The new box type one piece apron has bronze and ball bearings supporting both ends of all shafts with the moving parts submerged in oil. A one shot plunger pump forces oil to the cross slide and carriage ways and to the cross feed screw bearings. The single trip lever to operate the carriage and the apron will be approved by the instructor and appreciated by the student.

In the new eight speed geared headstock the gears for reversing and compounding the feed are entirely within the headstock. The single gear train on the end of the lathe eliminates overhang of the bearings, also troublesome tumbler gears and swinging plates.

All controls are within easy reach in front of the lathe. An illustrated catalog of Regal lathes will be mailed on request.

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Fig. 732

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Fig. 924

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Laminated Hardwood plank in front. Very popular with Die and Tool makers. Vise not shown. Drawer is extra. Finished in Olive green. Shipped from stock.

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Fig. 928

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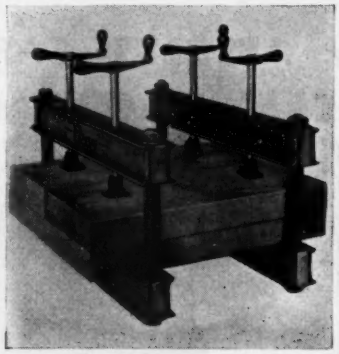
SCHOOL SHOP EQUIPMENT NEWS

FOR THE SUPERVISOR OR TEACHER WHO DESIRES TO KEEP ABREAST WITH THE NEWS OF NEW MACHINERY, TOOLS, SUPPLIES, ETC.

PONY VENEER-PRESS FRAME

The Adjustable Clamp Company, 424 North Ashland Ave., Chicago, Ill., has announced the marketing of its new "Pony" veneer-press frame, which has been produced in response to a demand for proper facilities to do an efficient job in veneer gluing. In the past, the expense of a veneer press, as well as lack of available space, has made such an installation prohibitive.



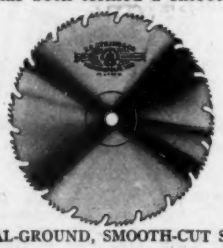
PONY VENEER PRESS FRAME

The Pony veneer-press frame is equipped with suitable top and bottom plates, of either 2-in. hard wood or 3/8-in. steel plate. With the use of independent frames, a press of any desired length may be obtained, with capacities up to 18 in. in width. The plates are not secured to the frames, so that it is easily possible to set up a press on a bench or table when wanted, and it requires a minimum of time to disassemble and store the frames and plates in some small space where it will be convenient for immediate use.

Complete information will be furnished on request.

NEW ATKINS DUAL-GROUND, SMOOTH-CUT CIRCULAR SAW

E. C. Atkins & Company, Indianapolis, Ind., have just issued a new dual-ground, precision circular saw, which is suitable for ripping, crosscutting, or mitering with efficiency and exactness. It has been termed a smooth-cut saw, because



DUAL-GROUND, SMOOTH-CUT SAW

it will make an exceptionally smooth cut at 75 to 80 ft. speed a minute, and operates equally well at 3600 r.p.m. on a high-speed, direct-driven machine.

This special ground saw runs without set and produces cuts for glue joining without the need of further finishing. The saw is made of the famous silver steel, is accurately tempered and tensioned, is finished in the Atkins dual-grinding process, and requires very little fitting for general upkeep and maintenance.

(Continued on page 13A)

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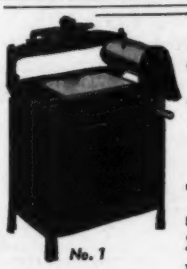

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State College, Pa.

(Continued from page 10A)

NEW SOUTH BEND LATHE BOOKLET

The South Bend Lathe Works at South Bend, Ind., have just announced the publication of a two-color, illustrated booklet, describing the new 8-in. junior lathe and its use in school shops and laboratories.

This small, back-geared, screw-cutting lathe is made in three types — motor drive, countershaft drive, and bench and floor-leg models. The booklet lists various tools and attachments for performing a variety of jobs and shows more than thirty photographs of different machining operations, including screw-thread cutting, drilling, boring, turning, facing, and taper work.

The firm also maintains a blue-print service which is available to instructors and students. The working drawings cover general machine-shop operations and the special fields of auto mechanics, electricity, farm shop, and laboratory work.

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DOUGLAS FIR PLYWOOD PROJECTS FOR SCHOOLS

The Douglas Fir Plywood Manufacturers, Skinner Bldg., Seattle, Wash., have issued an illustrated four-page circular describing their new plywood projects for use in school shops. The circular gives drawings and brief instructions for making a variety of projects, including a rack for lawn and garden tools, a laundry cabinet, a tool cabinet, a utility cabinet, a seed-storage cabinet, and a dustproof ash can.

The firm has a number of additional bulletins offering new plans suitable for building projects and other special uses in wood construction.

The School Shop Shopping Guide

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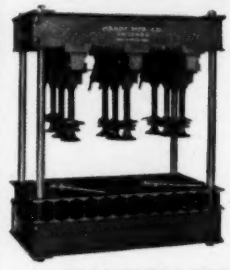

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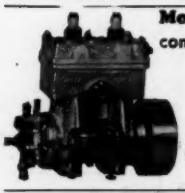

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